OVERVIEW OF
METRIC CONVERSION
IN THE
UNITED STATES
1983

Second Edition

March 2, 1984

Prepared for Metric Commission Canada By:

RES POLICY RESEARCH INC.
294 Albert Street, Suite 402
Ottawa, Ontario
KIP 6E6

J.F. COATES INC.
3738 Kanawha Street, N.W.
Washington, D.C.
20015

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TABLE OF CONTENTS

PREFACE i
ABSTRACT ii
EXECUTIVE SUMMARY iii

CHAPTER I THE PROJECT: SCOPE AND METHOD 1

- Introduction 1
- The Status of Metric Conversion in Business and Industry 3
- Activities in Government 5
- Federal Activity 6
- Specific Purposes of this Project 8
- Assessment of Scope and Methods 9
- What Follows 11

CHAPTER II THE STATUS OF METRIC IN U.S. BUSINESS AND INDUSTRY 12

SIC Division
- Agriculture 13
- Mining 14
- Construction 14
- Manufacturing
  - Food Processing 15
  - Tobacco 15
  - Textile Mill Products and Apparel and Other Finished Fabric Products 16
  - Wood Products 16
  - Furniture and Fixtures 17
  - Paper 17
  - Printing, Publishing and Allied Industries 17
  - Chemicals and Allied Products 18
  - Petroleum Refining and Related Industries 18
  - Rubber 19
  - Leather 19
  - Cut Stone and Stone Products 19
  - Structural Clay Products 20
  - Glass 20
  - Concrete 20
  - Primary Metal Industries 21

  - Fabricated Metal Products, Except Machinery and Transportation Equipment 22
  - Machinery Except Electrical 23
    - Engines and Turbines 25
    - Farm Machinery 25
    - Construction, Mining, Materials Handling 26
    - Metalworking Machinery and Equipment 26
    - Food Products Machinery 27
    - Paper Machinery 27
    - Printing Machinery 28
    - Miscellaneous Special Industry Machinery 28
    - General Industrial Machinery and Equipment 30
    - Computer and Business Machinery 31
  - Electrical and Electronic Machinery 32
  - Transportation Equipment 32
  - Air Transport Equipment and Parts 33
  - Measuring, Analysing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks 34
- Transportation, Communications, Electric, Gas and Sanitary Services Division 35
- Wholesale - Durable 36

- Retail

  - Building Materials, Hardware, Garden Supply and Manufactured Housing 36
  - General Merchandise Stores 36
  - Food Stores 37
  - Automotive Dealers and Gasoline Service Station 37
  - Apparel and Accessory Stores 37
  - Furniture, Home Furnishings and Equipment Stores 38
- Finance, Insurance, Real Estate 38

- Services

  - Hotels, Rooming Houses, Camps, and Other Lodging Places 38
  - Personal Services 39
  - Business Services 39
  - Automotive Repair, Services and Garages 39
  - Motion Picture Services 40
  - Amusements and Recretation Services, except Motion Pictures 40
  - Health Services 41
  - Legal and Social Services 41
  - Educational 42
  - Museums, Art Galleries, Botanical and Zoological Gardens 42
  - Eating and Drinking Places 43

CHAPTER III STATUS OF METRIC ACTIVITIES IN THE UNITED STATES GOVERNMENT 44

- Interagency Committee on Metric Policy Department of Commerce 45
- U.S. Department of Agriculture (USDA) 46
- Department of Commerce (DOC) 46
- Department of Defence (DOD) 47
- Department of Education (DEd) 47
- Department of Energy (DOE) 48
- Federal Communications Commission (FCC) 48
- General Services Administration (GSA) 49
- Department of Health and Human Services (HHS) 49
- Housing and Urban Development (HUD) 50
- Department of the Interior (DOI) 50
- International Trade Commission (ITC) 51
- National Aeronautics and Space Administration (NASA) 51
- State of Local Governments 52
- Tennessee Valley Authority 52
- Department of Transportation (DOT) 53
- Veterans Administration (VA) 53

CHAPTER IV CROSS CUTTING ISSUES 54

- Introduction 54
- Foreign Trade 54
- Standards 56
- The Types of Metric Activity 60

CHAPTER V U.S. CONSTRAINTS ON CANADIAN SECTOR CONVERSION 61

- Air Transport 62
- Rail Transport/Railroad Rolling Stock 62
- Heating, Ventilating, Air Conditioning/Food Service, Plumbing and Hydronic Heating 63
- Builders and Home Hardware 64
- Machinery and Fluid Power 65
- Recreation, Outdoor Power and Specialized Equipment 66
- Electrical Manufacturers 66
- Aircraft & Aircraft Parts Manufacturers 67
- Implementation of Radiological SI Units 68
- Structural & Architectural Metals 68
- Wood 69
- Paper and Allied Industries 70
- Amusement and Recreation, Sports 70
- Horticulture 71
- Fishing and Fish Products 72

CHAPTER VI GENERAL FINDINGS 73

CHAPTER VII FUTURE MONITORING - ADVICE AND RECOMMENDATIONS 78

- General Advice 78
- Guidelines on Probing Federal Agencies and Officials About Metric 78
- Guidelines for Approaching the Private Sector on the Status of Metric 79
- Recommendations 81
  - Use of 1983 Overview Results 81
  - Future U.S. Monitoring 81
    - Routine Update 81
    - Monitoring by OMC 81
    - Monitoring for Sectors 82

GLOSSARY 83

APPENDIX ANMC "PERSPECTIVE" 84

PREFACE

Since the beginning of Canada's involvement in metric conversion it was recognized that the timing and in fact, the success of the Canadian conversion program would be strongly affected by developments in the U.S. The White Paper of 1971 contains repeated references to U.S. constraints (e.g., Section 4.6.5 and 4.5.9).

The enabling Order in Council for the Metric Commission Canada contains the mandate to "study the implications of metric conversion", and isolates as one of its objectives the need to "obtain best advantages for Canada", combined with the need to minimize the cost of conversion. These elements of the Canadian approach to metric conversion point to a continuing mandate to monitor the metric conversion process in the U.S.

The work plan for the phase-out of the Metric Commission Canada is now in place. Without unduly anticipating its results and major emphasis, it can be stated that some form of monitoring activity will continue and that the status of metric conversion in the U.S. will necessarily remain a major element of the future monitoring program. Yet there is no program in place to assess the status of conversion in the U.S. in a methodical, replicable way for the benefit of Canadian policy development and for industry. This is an urgent need given the relatively high degree of conversion in Canada, the confusion about the conversion process in the U.S., and the dependencies of many Canadian sectors upon their U.S. counterparts.

This project provides an overview of current U.S. metric conversion activities as well as the base for a continuing monitoring process of the status of metric conversion in the United States. As an initial effort in this regard, it builds upon the foundation work by RES Policy Research's review of the literature, Ottawa, October 8, 1982, and several research studies on the status of metric conversion in the United States by J.F. Coates, Inc., Washington, D.C. Its purpose is to create a conceptual framework and to identify opportunities and avenues for continual monitoring of the status of metric conversion together with its impacts on Canadian developments.

The first edition of this report was assessed by the Office of Metric Programs of the U.S. Department of Commerce; and by the metric coordinators of the Department of Defense; the Department of Education; the Department of Energy; and the National Aeronautics and Space Administration. This, the second edition of the report, incorporates the valuable comments and suggestions received. In addition, excerpts from a report prepared by the American National Metric Council for Metric Commission Canada are included where appropriate to provide further information on the private sector.

This project, under the contract management of Fred W. Buser of the Metric Commission Canada, is a collective product of the work of Rolf Schliewen, Jacques de Verteuil at RES Policy Research, Inc., and Joseph F. Coates, Henry H. Hitchcock, Tracie Monk, Mary Ann Madison, Jennifer Jarratt of J.F. Coates, Inc. The project has also enjoyed the wisdom and participation of Stanley Parent, former Director of Coordination, Planning and Research, and Deputy Executive Director of the United States Metric Board.

OVERVIEW OF METRIC CONVERSION IN THE UNITED STATES - 1983

ABSTRACT

America is moving toward metric. The central driver to metric conversion is the growing integration of the U.S. into the global economy. As this integration increases, the pressure on U.S. companies to use metric will increase. These conclusions are based on an overview of metric conversion activities in U.S. business, industry, and government. The overview covered all major sectors of the U.S. economy and government.

In the industrial sector, the Original Equipment Manufacturers who produce heavy machinery and automobiles lead conversion. The most active firms are multinationals seeking to standardize production on a worldwide basis. The conversion of these large manufacturers has led to conversion on the part of their suppliers and service organizations.

At the governmental level, the Federal Government policy is to follow the lead of industry in converting to metric and to remove barriers to conversion resulting from federal laws, regulations, standards, or practices. Some states continue to have regulations which inhibit the use of metric but the number is declining. Metric is well established in the primary and secondary mathematics curricula and in science and engineering education.

Three factors are important influences to metric conversion in the U.S.

- Foreign trade is an increasingly important factor in stimulating interest in metric conversion. With the decline of U.S. technological leadership, this importance will increase.
- There has been some progress in soft converting U.S. standards and less progress in creating hard metric standards. With the decline of U.S. industrial prominence, the importance of foreign metric standards will increase.
- A decline in metric conversion activities since the mid 1970's is apparent. In effect, this is the result of a reduction in planning activities and an increase in the less visible but more substantial conversion of products.

Regarding the seventeen constraints on Canadian conversion identified by the Canadian Sector committees, all are real constraints. In all but two cases, there is little prospect for a reduction in the constraints over the next several years.

RES POLICY RESEARCH INC.
294 Albert Street, Suite 402
Ottawa, Ontario
KIP 6E6

J.F. COATES INC.
3738 Kanawha Street, N.W.
Washington, D.C.
20015

EXECUTIVE SUMMARY

Scope and Method of the Assessment

This project provides an overview of metric conversion activities in the United States with special emphasis on developments consequential to Canadian conversion efforts. The purposes of the study are fourfold. They are to provide information;

1. for the assessment of the implications of U.S. based impediments to Canadian conversion;
2. on the status of U.S. conversion in order to assist the management of the Canadian metric program;
3. to assist in the MCC Phase-Out Program;
4. to assess the implication of the status of U.S. conversion on Canadian exports.

Given the scope, constraints, and the complexity of the U.S. economy it was decided that the study's objectives would be best accomplished by the collection of qualitative data. Previous studies support this decision by arguing that focussed, qualitative industry analyses have better predictive value. The study was divided into three parts as follows:

- A survey of metric activity in all U.S. industries
- A survey of government metric activity
- Focussed inquiries into the status of constraints in seventeen industries identified by MCC

Data collection techniques included telephone interviews with trade associations and editors of applied journals to identify areas of metric activity. Where activity was found more in-depth interviews were conducted with companies involved in metric conversion.

Identifying metric activity in the Federal Government included interviews with the secretariat of the U.S. Interagency Committee on Metric Policy, with metric coordinators in each agency, and with selected individuals identified as being knowledgeable about the agency's activities. Most of the interviews were by telephone though some of the more significant agencies were examined in personal interviews.

Where possible, the sectors identified as having potential constraints to Canadian conversion were more fully investigated during the course of the industry and government surveys.

Exhibit 1 gives an overview of the status of metric activities in the different areas of the U.S. economy. The exhibit is organized along the lines of the Standard Industrial Classification (SIC). By metric activity, the exhibit refers to industry actions in planning metric conversion, creating metric standards, labelling customary products in metric dimensions, producing products using customary and metric components, or producing products and providing services using hard or rational metric units.

Activity in Business and Industry

The picture is quite varied with the majority of metric activity occurring in the manufacturing division and very little in the wholesale and retail areas.

Several of the industries are in a state of transition as the following points describe.

- Metal products are being affected by the original equipment manufacturers.
- Science and engineering (high tech industries) are increasingly committed to metric. The development and product stage is lagging.
- The industries serving industry, such as die-casting, patternmakers, and toolmakers, are excellent indicators of conversion because they are in the middle of any transitions. They currently reflect an uneven pattern of conversion with automobiles and heavy machinery leading, and construction and consumer appliances lagging.
- International marketing factors are influencing tansportation, communication and the electrical industry though the effect is not uniform.
- The electronics industry in general is uncertain about committing itself to metric but business machines are definitely converting.

General conclusions about the status of metric in the U.S. economy are:

- Significant metric activity is primarily driven by international trade considerations.
- The leaders in metric conversion are the large multinational firms. Key areas include the original equipment manufacturers, manufacturers of heavy machinery, agricultural equipment, construction equipment, and the automobile industry.

- Large companies are pulling their suppliers into metric conversion.

- The feeling that metric is inevitable is not universal. One-third of the respondents felt that it was not inevitable with some expressing the opinion that it would not come.

- Most industries not involved in metric conversion feel that the push to metric is coming from forces outside their own industry.

- The demise of the United States Metric Board (USMB) has created a degree of confusion and slowed or stopped planning in some areas of industry.

- Market Penetration: sale of metric products in the U.S. is low to moderate dependent on the industry. With the exception of processed foods, most of this market penetration involves the sale of hard metric products. In some industries such as autos there is high market penetration; in others such as construction there is no market penetration of metric designs.

Government Activity

The following conclusions can be drawn from the review of metric activity at the federal, state and local Government levels.

- There is no government policy promoting the use of metric in the economy. The action in the economy is wholly the product of private sector decisions.

- The Federal Government policy supports voluntary conversion initiated by the private sector. Active agencies such as Defense and the General Services Administration as well as less active agencies such as Agriculture and Transportation will follow the lead of the industries they serve or regulate. The primary thrust of the government's limited metric activity at present is to identify and remove impediments to the use of metric measurement by private sector.

- Legislation Enacted: There has been no substantial legislative initiative on metric at the national level since the 1975 Metric Conversion Act. There is no indication that there will be any legislative activity in the next several years. At the state level most activity is in terms of regulations and codes especially in regard to weights and measures, housing and highways. With the exception of gasoline pumps, there has not been any substantial activity at the state level within the past five years.

- Support Provided to Sectors by Government or Other Sources: Government's role in metric has changed its focus since the demise of the U.S. Metric Board and the establishment of the Office of Metric Programs in the Department of Commerce. The OMP no longer engages in research and public information and education but rather stresses the need for metric conversion in regard to its impact on international competitiveness. Government officials continue to participate in standards and metric planning activities — most notably in connection with the American National Metric Council (ANMC). The major support for conversion planning in the U.S. comes from the private sector in terms of contributions to ANMC.

- On metric issues, state governments are less active than the Federal Government. For the most part they respond to federal initiatives but rarely raise any new metric issues on their own. The states were more active in the past than they are today. Of the 22 state metric committees set up in the 1970's only 4 are still active and all 4 are voluntary organizations. None are funded by the states.

- There are a number of state regulations and practices that inhibit the use of metric. Building codes in most states remain in customary units. There is little prospect for change given the slow pace of conversion in the construction industry. In terms of retail goods, Federal statutes prohibit the use of metric only labelling on consumer items. On non-consumer items, 9 states prohibit the use of metric only labelling for reasons of policy or existing legislation.

- Education is a major metric activity of the states. Metric has become an accepted element of the math curriculum of primary and secondary schools in many but not all counties and states. Textbooks are published using metric only or metric and customary units. Vocational education has responded to changes in industry, most notably the use of metric in auto repair. Metric is also used in science and engineering education. However, with the abandonment of federal funding for metric education initiatives, there has been little progress in remedial or adult education.

Cross-Cutting Issues

Three major issues cut across metric activity in industry and government. These issues are foreign trade, standards, and the type of metric activity.

1. Foreign Trade

- The growing integration of the U.S. into the global economy is increasing the importance of metric conversion for U.S. companies.

- The majority of U.S. trade is measurement sensitive.

- The large multinationals are the source of much of the U.S. integration into the global economy and hence of much of the pressure on U.S. industry to convert to metric. In a number of cases, most notably the automobile industry, the desire for global economies of scale has led to world wide corporate standardization along metric lines. Foreign nations' demands for exporting and for local content also led to the desire for worldwide standardization in order to facilitate the use of parts made in one country on a product made in another. The world car is a good example of this global standardization.

- Another source of metric conversion is the growing use by multinational firms of foreign product designs often under a licence arrangement with foreign manufacturers. Most of these foreign designs are in metric. When the firm makes the product in a U.S. factory, they make it to metric dimensions. Related to this is the growing amount of foreign owned manufacturing done in the U.S. This foreign owned manufacturing often uses metric designs and production.

- One factor dampening the move of the U.S. to metric is the tendency to shift U.S. multinationals to use foreign facilities to produce goods for foreign markets. While this exports U.S. jobs and small business opportunities, it also reduces the pressure on U.S. firms to produce in metric dimensions to meet the needs of the foreign market.

- Most small and medium U.S. companies do not export. The large domestic market absorbs their interest. When the domestic market sags, some of these companies turn to foreign markets. For the most part they attempt to sell products produced in customary units for U.S. markets to foreign markets.

- Where the U.S. has dominated design, standards and production, customary units prevail. This is especially evident in the aerospace industry. With the decline of U.S. dominance will come increased foreign demand for the use of metric measurements and products.

2. Standards

- Standards/Codes Converted: the status of standards conversion depends largely on the industry. Most industries involved in metric have soft converted existing U.S. standards to include metric equivalents. The recent General Services Administration (GSA) policy in the Use of Metric in Federal Standardization Document reflects the increasing use of metric in standards. However, the number of hard metric U.S. standards remains quite small.

- U.S. standards developing organizations do not recognize metric as a major issue or problem. The market is not demanding metric standards.

- There is a recognized need for raising the awareness of metric issues among standards users and writing organizations. This is especially true for considering hard metric in new product design and new areas of technology.

- As the competition among nations in standards writing increases, the dominance of U.S. standards in international use will decline and the role of metric standards will increase.

- Several industrialized countries are aggressively marketing their metric standards in bilateral and multilateral negotiations.

3. Type of Metric Activity

In the mid-1970's most metric activity was planning or related activity — talking about converting, looking at standards, laws, regulations, and other documents to identify barriers or problems for converting. While this planning continues today, the emphasis has shifted to the less visible conversion of products or of product labelling. Ironically, much of the "actual conversion" now occurring is weakly related, if at all, to the sector planning of the middle 1970's. In short, in the U.S., metric conversion has moved from being an issue of policy and public debate, as reflected in the press, to a matter of operations on the factory or shop floor. In education, metric has moved from being an issue before parents' associations and school boards to an activity involving teachers and students.

Constraints on Canadian Conversion

This assessment addressed seventeen specific U.S. standards or practices identified by Canadian sector committees as impeding conversion to metric in Canada. Some of these constraints are specific institutional barriers such as FAA air and ground operations nomenclature and ANSI/ASTM standards for wire gauge sizes. Others such as building design and engineering practices are based on long-standing tradition, overlap many industries and products, and are dependent on customer demand.

In investigating seventeen specific U.S. constraints to Canadian metric conversion, progress was found in two areas: The ASME Boiler and Pressure Vessel Code which governs the design and inspection of boilers was released by ANSI in October 1983; and the United Fresh Fruit & Vegetables Association is still actively working on the conversion of pallet and container standards. In the other sectors investigated, the constraints remain in place with no immediate prospects for change expressed by industry members contacted.

Other General Findings

No evidence was found that metric conversion proceeded as a result of overall coordinated industry or sector planning. Conversion results largely from incremental, individual corporate decisions.

There has been little adverse reaction to metric conversion. However, most conversion has occurred in the industrial area. Retail firms see little customer interest in metric and anticipate significant negative reaction should conversion of retail goods be attempted.

In the U.S. there is a widespread lack of differentiation with regard to the metric system of measurement. Most people in the U.S. use the terms "customary", "English" or "metric" and do not understand the term SI.

The Future of Metric Conversion in the United States

The use of metric measurement by U.S. industry will grow. Growth will come on a product-by-product basis not by wholesale industry conversions.

Most metric products produced by U.S. industry will continue to be hybrids combining metric and customary components.

Momentum for conversion will be strongest in manufacturing industries, especially those tied to global markets.

Retail and wholesale trade will be among the last sectors of the economy to convert to metric.

As the U.S. becomes more integrated into the global economy, foreign markets, designs, and products will become more important to a wider range of industries -especially in the manufacturing and service sectors. This will mean a growing importance of metric for U.S. industries.

Government is unlikely to promote the use of metric in the economy. Government will ease the way for the use of metric products once it becomes clear that industry has converted to metric.

Schools will continue to use metric in math and science curriculum at the primary and secondary level. Vocational education will respond to changes in the industries it serves. However, there are unlikely to be any major metric education initiatives without support from the Federal Government. The prospects for such support are dim.

EXHIBIT I

DIAGNOSTIC SUMMARY - U.S.A. METRIC STATUS

ECONOMY DIVISION (SIC)	PRESENT LEVEL OF METRIC ACTIVITY			
	NONE	LOW	MEDIUM	HIGH
AGRICULTURE		■		
AGRICULTURE SERVICES			■	
-CROPS		■		
-AGRICULTURAL MACHINERY			■	
-AGRICULTURAL LIVESTOCK AND POULTRY	■			
MINING		■		
CONSTRUCTION		■		
PROCESSED FOOD (MANUFACTURING)		■		
TOBACCO (MANUFACTURING)			■	
TEXTILE AND APPAREL (MANUFACTURING)	■			
WOOD PRODUCTS (MANUFACTURING)		■		
FURNITURE AND FIXTURES (MANUFACTURING)		■		
PAPER AND ALLIED PRODUCTS (MANUFACTURING)		■		
PRINTING, PUBLISHING AND ALLIED INDUSTRIES (MANUFACTURING)		■		
CHEMICALS AND ALLIED PRODUCTS (MANUFACTURING)				■

ECONOMY DIVISION (SIC)	PRESENT LEVEL OF METRIC ACTIVITY			
	NONE	LOW	MEDIUM	HIGH
PETROLEUM REFINING (MANUFACTURING)		■		
RUBBER (MANUFACTURING)			■	
LEATHER (MANUFACTURING)	■			
CLAY, GLASS, STONE, CONCRETE (MANUFACTURING)		■		
STRUCTURAL CLAY PRODUCTS (MANUFACTURING)	■			
GLASS (MANUFACTURING)			■	
CUT STONE AND STONE PRODUCTS (MANUFACTURING)	■			
CONCRETE (MANUFACTURING)		■		
PRIMARY METALS (MANUFACTURING)		■		
FABRICATED METALS (MANUFACTURING)			■	
MACHINERY, NON-ELECTRICAL (MANUFACTURING)			■	
MACHINERY: -Engines				■
MACHINERY: -FARM				■
-CONSTRUCTION, MINING, MATERIALS, HANDLING				■
-METAL WORKING			■	

EXHIBIT I

DIAGNOSTIC SUMMARY - U.S.A. METRIC STATUS

ECONOMY DIVISION (SIC)	PRESENT LEVEL OF METRIC ACTIVITY NONE	LOW	MEDIUM	HIGH
-FOOD PRODUCTS		■		
-PAPER			■	
-PRINTING			■	
-MISCELLANEOUS SPECIAL INDUSTRY		■		
-GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT		■		
-COMPUTER AND BUSINESS			■	
ELECTRICAL AND ELECTRONIC (MAN)			■	
TRANSPORT EQUIPMENT (MAN.)		■		
TRANSPORT EQUIPMENT - MILITARY AIRCRAFT, GUIDED MISSILES, SPACE VEHICLES (MAN.)			■	
SCIENTIFIC EQUIPMENT (MAN.)			■	
TRANSPORTATION, COMMUNICATIONS ELECTRICAL, GAS & SANITARY SERVICES		■		
WHOLESALE - DURABLES		■		
BUILDING MATERIALS (RETAIL)	■			
GENERAL MERCHANDISE STORES (RETAIL)		■		
FOOD STORES (RETAIL)		■		

ECONOMY DIVISION (SIC)	PRESENT LEVEL OF METRIC ACTIVITY NONE	LOW	MEDIUM	HIGH
AUTO AND GASOLINE DEALERS (RETAIL)			■	
APPAREL AND ACCESSORY STORES (RETAIL)	■			
FURNITURE, HOME FURNISHING AND EQUIPMENT STORES (RETAIL)	■			
FINANCE, INSURANCE AND REAL ESTATE	■			
HOTEL SERVICES (SERVICES)	■			
PERSONAL SERVICES (SERVICES)	■			
BUSINESS SERVICES (SERVICES)		■		
AUTO REPAIR (SERVICES)			■	
MOTION PICTURE (SERVICES)		■		
AMUSEMENTS AND RECREATION SERVICES				■
HEALTH SERVICES (SERVICES)				■
LEGAL AND SOCIAL SERVICES (SERVICES)	■			
EDUCATION SERVICES (SERVICES)			■	
MUSEUMS, ART GALLERIES, BOTANICAL & ZOOLOGICAL GARDENS (SERVICES)				■
EATING AND DRINKING PLACES (SERVICES)		■		

CHAPTER I

THE PROJECT: SCOPE AND METHOD

Introduction

The purpose of this project is to conduct a comprehensive review of the status of metric conversion in the United States, concentrating on those industries and developments which will have the strongest direct and indirect consequences for Canadian industry. This comprehensive analysis will provide the Metric Commission Canada with a baseline for future investigations on a regular or *ad hoc* basis.

Any activity as broad in its sweep as this study must make sharp trade-offs between depth of detail, and comprehensiveness, reliability and utility of the product. Based on extensive interaction with the MCC staff and our own prior experience in surveying various aspects of metric conversion in the U.S., the project was divided into three parts:

* A survey of metric activity in all U.S. industries as defined by the Standard Industrial Classification
* A survey of government metric activity
* A more detailed investigation of specific areas earmarked as of critical concern to MCC

The following section covers the details of the work plan and provides an overview of the report.

The Status of Metric Conversion in Business and Industry

The central problem in a scanning project of this sort is to capture the sense of change and the associated momentum.

A second problem is to identify the forces promoting change. Knowledge of these forces will permit independent monitoring and validation and could, from an investigative point-of-view, become surrogates for direct measures of change.

A third problem is to forecast the pace and shape of metric activities influencing the future of developments in business and industry.

To deal with these problems for the business and industry sector it was agreed that a multi-level approach framed around the Standard Industrial Classification (SIC) would be appropriate. Exhibit 2 shows the basic divisions and the associated groups under each division. Together these comprise the first two digits of the SIC categories. By following this classification as the framework for analysis, convenient access is provided to a large amount of data that relates to a conceptual framework widely understood in business and industry. The SIC orientation helps to organize a uniform approach to the survey. In general, we did not go to third or fourth digit levels, as defined SIC categories, except where the early analysis showed the value of such approach or where the industry is so complex, as in machinery, that the basic unit of analysis was the third digit.

The first level of the approach dealt with trade associations. These are primary sources of general information with regard to metric activities, in particular in businesses and industries. Trade associations provided judgement, evaluation, and analyses about the past, present, and future of metric activities with respect to their industries. Trade associations were more effective sources of information than the closely related professional associations or lobbying groups.

EXHIBIT 2
BUSINESS AND INDUSTRY AREAS SURVEYED BASED ON THE STANDARD INDUSTRIAL CLASSIFICATION (SIC)

DIVISION A - AGRICULTURE

DIVISION B - MINING

DIVISION C - CONSTRUCTION

DIVISION D - MANUFACTURING
- Food and kindred products
- Tobacco manufacturers
- Textile Mill Products
- Apparel
- Lumber and wood
- Furniture
- Paper
- Printing
- Chemicals
- Petroleum refining
- Rubber
- Leather
- Stone, clay, glass, concrete
- Primary metals
- Fabricated metal
- Machinery except electrical
- Electrical/electronic machinery
- Transportation equipment
- Measuring, analyzing, controlling instruments
- Miscellaneous

DIVISION E - TRANSPORTATION, ETC.
- Railroad transportation
- Local/suburban highways
- Motor freight/warehouse
- U.S. Postal Service
- Water transportation
- Pipelines
- Transportation services
- Air transportation
- Communication
- Electrical, gas and sanitary

DIVISION F - WHOLESALE TRADE

DIVISION G - RETAIL TRADE
- Building Materials
- General merchandise
- Food stores
- Automotive dealers & gas stations
- Apparel/accessories
- Furniture
- Eating/drinking places
- Miscellaneous

DIVISION H - FINANCE, INSURANCE, REAL ESTATE
- Banking
- Credit agencies
- Brokers
- Insurance
- Insurance Brokers
- Real estate
- Combinations
- Holding & other Investment offices

DIVISION I - SERVICES
- Hotels
- Personal
- Business
- Auto repair
- Miscellaneous repair
- Motion pictures
- Amusement, recreation
- Health
- Legal
- Education
- Social
- Museums, art galleries
- Membership organizations
- Private households
- Miscelaneous services

DIVISION J - PUBLIC ADMINISTRATION

DIVISION K - NONCLASSIFIABLE ESTABLISHMENTS

The second level of approach involved the editors of applied journals. Earlier metric research established that the editors of applied, in contrast to scientific journals, were likely to be effective sources of information on metric. They were particularly aware of metric activities because their general assignment of keeping abreast of developments forces them to be alert to any significant change.

The third level of analysis was to contact specific companies, usually large corporations, to further probe activities, attitudes, and judgments about trends and developments. This third level was reserved for sectors where some metric activity had been identified at the first or second level. Generally, these contacts were provided by the associations or journal editors.

In order to accomplish the comprehensive analysis within time and budget, a wide range of areas were covered in the early stages of the project. Where metric activity was found, a deeper probe was undertaken.

Several telephone interview survey forms were developed; a preliminary survey form for trade associations and journals (Appendix C), an in depth survey for associations and journals (Appendix D), a form for companies (Appendix E). The forms used with association officials, editors, and corporate representatives are almost identical. Metric activities include metric discussions, metric planning committees, metric standards, metric products, and just about any other activity involving a move towards the full use of metric.

All respondents were assured that their responses would be held in full confidence. On the basis of the interviews, summary reports were prepared. These reports follow the one or two digit SIC level, as indicated earlier. Once substantial activity was identified or anticipated in a particular sector detailed analysis was performed at the third digit level. Summaries of these interviews comprise the bulk of the present report. The full summaries for industry surveys are included in Appendix A.

Activities in Government

Government's relation to metric conversion has been changing over the last decade and is complex and confused. In addition to the multiple layers of government at Federal, State and Local level, there is also within the Federal Government, the sharp constitutional division between Executive, Legislature, and Judiciary branches.

The early significant effort at exploring and understanding metric was the National Bureau of Standards Study completed in the early 1970's. Following that study a national debate considered the pros and cons of converting to metric. Several metric conversion bills were introduced and were debated in Congressional committees. These committees also considered the views of interested parties who were given the opportunity to testify. The culmination of that debate was the passage of the Metric Conversion Act of 1975. The act was a compromise between those advocating a mandated conversion by a specific date and those opposed to conversion. The official policy of the U.S. was and still is voluntary conversion to metric by the private sector. The debate and the passage of the Act stimulated a number of companies and industries to create their own plans for metric conversion in order to forestall or pre-empt Federally mandated conversion.

The 1975 Act laid the foundation for the formation of the U.S. Metric Board and by 1978 the Carter Administration had appointed a slate of Board members. The Board pursued research and Public Information programs pursuant to the mandate of the 1975 Act. These are summarized in the USMB final report and the Research Analysis and Overview. On September 30, 1982, the U.S. metric Board was abolished as part of the Reagan Administration's economy moves. The responsibility for carrying out the mandates of the 1975 Act were transferred to the Department of Commerce's Office of Metric Programs (OMP) which has a 5 person staff and a $300,000 a year budget to deal with metric issues. In its heyday the U.S. Metric Board had over 40 employees and a budget of $2.7 million.

By the time of the abolition of the U.S. Metric Board, the movement toward metric was driven by a number of factors, many of which were almost independent of government, notably, international trade and commerce. The infrastructure laid in place in government, for understanding, evaluating, and in some cases, supporting, conversion to metric, continues to evolve. This evolution is not however, at a uniform rate or direction. Consequently, understanding activities at the federal level is essential to fully understanding the pace of metric conversion in the United States. It will put into perspective the conversion activities identified in the private sector.

In addition to the Federal Government, there are 50 state governments and thousands of local governments. These state and local governments have a wide range of responsibilities including highways, education, health, housing and building codes and standards, weights and measures, and other consumer regulation. The key metric areas in the state and local governments are weights and measures and education. States have been particularly active in introducing metric into the school systems. They have also, in some cases, cleared the way to allow metric products to be sold in the States. Despite these activities, the main governmental action regarding metric is at the federal level.

Federal Activity

Federal activity in metric is fairly concentrated within agencies and across agencies. For the most part, metric coordinators are the most knowledgeable people in the agencies regarding metric matters. If a metric issue arises, the metric coordinator is the most likely person to be involved or consulted. Therefore they are the most appropriate people to contact for an overview of metric activity in each agency.

In the larger agencies there are often metric coordinators for the sub-agencies. For example, there is a metric coordinator for the Federal Aviation Administration within the Department of Transportation. The sub-agency coordinators are the best people to contact about specific metric activity in these agencies.

The secretariat of the Interagency Committee on Metric Policy (ICMP) appears to be the single most knowledgeable source of information on the status of metric in the Federal Government. The ICMP Secretariat is currently the Office of Metric Programs (OMP) in the Department of Commerce. The OMP prepares an annual report for the ICMP on the status of metric activity in the Federal agencies; the most recent report is from 1981; a 1983 version is being prepared. The ICMP also prepared a metric referral directory in 1981; it too is being updated. This directory names the individuals to contact on particular metric programs, products, or activities in the Federal Government.

Discussions with the secretariat of the ICMP provided a good sense of where metric activity is taking place in the Federal Government. This activity was divided into two major types - procurement and regulation. The key procuring agencies are Defense, the General Services Administration, Energy, NASA, Veterans Administration, Agriculture, Interior, Transportation, Health and Human Services, and the Tennessee Valley Authority. The metric coordinators in each of these major agencies were contacted. Together these agencies account for over 90% of all Federal procurement.

In addition to the procurement agencies the major regulatory agencies of the Federal Government were covered. These include the Federal Communications Commission, the Food and Drug Administration (which regulates 25% of consumer purchases), the Department of Housing and Urban Development, the Department of Commerce, the International Trade Commission, and others. In addition, the procuring agencies noted above have regulatory responsibilities which are described in the interview summaries.

The government interviews (see Appendix F) covered:

* agency policy
* internal directives
* regulations
* public information and press releases

- consumer complaints
- relations with Congress on metric
- the future of metric in the agency
- other people who were knowledgeable about metric activities

In three cases, Defense, GSA, and Commerce, face-to-face interviews were conducted, since these are the most active agencies in metric conversion. These interviews covered the same areas as the telephone interviews, only in more depth.

The areas covered in the interviews were developed through consultations with Stan Parent, former Director of Planning, Coordination and Research at USMB and with Dr. David Goldman and other members of the OMP staff. When asked if they had anything else to add, none of the respondents added anything. This was taken as an indication that the full range of activities in these agencies had been covered in the interviews.

Specific Purposes of this Project

The overview of U.S. metric conversion concentrates on: major achievements in the private and public sectors; major unresolved issues in the private and public sectors; major impediments at sector, state, and Federal Government levels; status and trends in U.S. sectors constraining Canadian conversion; and significant short-range goals at private sector and public sector levels.

The specific purposes of this overview are as follows:

1. To provide relevant information for the assessment of the implications of U.S. impediments on Canadian conversion, with emphasis on those U.S. sectors which contrain metric conversion in specific Canadian sectors.
2. To provide relevant information on U.S. conversion status to Canadian Sector Committees and Working Groups for conversion management purposes.

3. To provide information to facilitate management of the MCC Phase-out Program in the light of current and foreseeable U.S. conversion.

4. To facilitate assessment of implications of U.S. conversion status on Canadian exports.

Assessment of Scope and Methods

This section presents our appraisal of the scope, methodology and limitations of the present study. It anticipates results described in subsequent chapters and reflects conclusions drawn by the project team and Mr. Buser from the MCC in review meetings held in Washington on October 18-20, 1983.

Concerning the scope of this project, it must be realized that there have been no previous attempts, either in Canada or the U.S., to assess the status and outlook of metric conversion for all sectors, with one methodology. Given the constraints of time and budget (three months and about nine person months, respectively), and the fact that there is no previous experience on how to conduct national overviews, the choice of methods had to be carefully considered. The scope was given by these requirements:

- Full coverage of the economy at the 2-digit SIC level
- Specific research in sectors with some metric "action"
- Focused inquiries into the status of constraints in seventeen industries of specific concern to Metric Commission Canada.

Given the scope, constraints, and the complexity of the U.S. economy, it would have been unwise to attempt any kind of quantitative study, for example, in the form of a survey purporting to measure the dollar value of metric-converted production. There exists no accepted methodology for such measures, and previous studies have argued that focussed, qualitative industry analyses have better predictive value. Having decided to collect qualitative data from knowledgeable respondents, the project team makes no pretense of quantitative treatment of the data. This is the main reason why the overview report is so bulky — we see no way to compress the data without falsely quantifying them.

This report avoids references to numbers of industries that may or may not foresee a future change in their level of metric activity. Industries differ on too many dimensions to be added up, and their diverse interlinkages cannot support such treatment. The present study did not allow us to isolate linked subsets of the U.S. input-output table for a joint metric study, that is, using a method common to economic treatments of technological change.

In sum, the data reviewed here consist of ratings of status and outlook for metric action, backed up by qualitative information. The following features of our method, field procedures and results justify our claim that this overview and the interpretive arguments of this report are credible.

Purposive sample: respondents were chosen for their knowledge or the knowledge which should be available to their job role. Referrals were solicited and used. Unqualified mailing lists were avoided.

Use of related knowledge: In elite and specialized interviews, the cooperation and sometimes, veractiy of respondents is strongly influenced by the amount of subject knowledge which the researcher can display during the contact. We made conscious use of this method.

Consistent judgements of the Research Team: Staff in direct contact with respondents all had prior experience in metric research, worked as a team from one location, and applied a common set of rules when converting free-form responses into ratings. For example, if an industry reported metric planning activity in the 1970's, which is now dormant, then this industry would be rated as having no activity. But if a multinational in this industry has recently switched to actual metric in at least some of its production, this was judged as representing at least low metric action, and, depending on results of probing, future increases in metric action would be expected. The basis for the judgments on current status of metric activity in these industries can be found in the individual industry summaries contained in Chapter II of the report. In general, "none" refers to areas where there is no activity of any consequence. "Low" activity refers to areas where minimal action usually in planning, standards or labelling is occurring. "Medium" activity denotes a more substantial industry use of metric especially actual metric conversion of products or services. "High" metric activity in U.S. industry is rare — it indicates wide movement to the production of hard metric products.

While there are probably some errors of fact or emphasis in this report, we know that the general findings are reliable. That is, the same study conducted in 1983 by a different team with equal qualifications would produce the same results. It is a different matter, however, whether the outlook remains valid. While the salience of metric as an issue has declined in the U.S., although metric practice is slowly growing, this might change in the future. For example, the steady export of U.S. jobs to foreign countries has yet to be linked in the thinking of the U.S. labour movement to the absence of metric practice in the domestic market, at least as a contributing factor. Such a shift of perception might cause a drastic change in the salience of metric. Our assessment of outlook, therefore, should be checked and updated.

What Follows

Following this introductory chapter is Chapter II on the status of metric conversion in U.S. industry. Chapter III deals with the status of U.S. metric in the United States government. Chapter IV discusses several issues such as exports and standards which cut across activities in different industries and agencies. A number of specific questions were raised by MMC about constraints with regard to seventeen sectors. The specific responses to these questions are handled briefly in Chapter V. Chapter VI presents the overall findings on the status of metric conversion. Chapter VII addresses the question of what next and offers guidance for future assessments. Appended to the report are the specific industry summaries (Appendix A) and the government summaries (Appendix B) which form the basis for Chapters II and III. The interview forms are attached as Appendices C through F. Appendix G contains attachments relevant to U.S. Government metric activities.

CHAPTER II

THE STATUS OF METRIC IN U.S. BUSINESS AND INDUSTRY

This Chapter presents the summaries of the assessments of the status of metric in the industries listed in Exhibit I. Since the assessment was not entirely in one to one correspondence with the SIC code, the scope of each summary is defined in the opening sentences.

The summaries presented in this chapter cover the scope of the industry covered, the current status, and the prospects for conversion. Each of these points is covered in more detail in Appendix A. Appendix A also discusses which sources are best for getting information about the status of metric in any specific industry.

The information contained in the summaries is also presented in graphic form and included following their written counterparts. Each chart shows the past, present, and expected future status of metric activity in the industries covered. Definitions of the terms used in these charts are found in the Glossary. The charts also describe the type of activity and the overall position of the industry toward metric. For a brief overview of the status of metric, these charts may be the most appropriate source.

AGRICULTURE DIVISION

Summary

The agricultural division report includes production of crops, livestock, and poultry; agriculture services and farm machinery and equipment. For most of the agricultural industry, use of metric weights and measures is negligible to non-existent. Exceptions include U.S. manufactured heavy farm machinery and equipment which are manufactured by international firms using predominantly hard metric components. Most noteable are earthtilling and harvesting equipment. Many scientific and technical agricultural services use, or are exposed to, metric in their work. The United States Department of Agriculture publishes some crop statistics in metric and assists farmers with metric-related export questions. Metric conversion will continue at low levels with most of the action appearing in farm machinery and equipment and in agricultural services.

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
TYPE OF METRIC ACTIVITY (IF ANY)	Planning	Standards	Labelling	Hybrid	Hard
	☐	■	■	☐	■

OTHER Government, Public, and Statistics in metric.

FORMAL METRIC POLICY?	None	Pro	Anti
	☐	■	■

INDUSTRY VIEW ON METRIC	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
	■	☐	☐	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: AGRICULTURAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY): Planning ☐ Standards ☐ Labelling ☐ CONVERSION: Hybrid ☐ Hard ■

OTHER Covers a range of services: scientific, management, and labor.

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ■ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promote active ☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: CROPS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER Export accommodation statistics

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☒	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURAL (MACHINERY)

MAJOR GROUP: FARM MACHINERY AND EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	☐	■	■

OTHER ____________________

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

Most of the heavy farm machinery and equipment has been converted or is in the process of being converted. Metric activity will be at low levels over the next 5 years.

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: LIVESTOCK AND POULTRY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	☐	■

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☐

OTHER COMMENTS

MINING DIVISION

Summary

The mining sector covers all establishments engaged in mining. This includes the extraction of minerals, preparation of minerals at the mine site, and exploration and development of mineral properties. The purchase of imported extraction and ore moving equipment by U.S. mining companies has not altered industry practices substantially. No movement toward metric conversion is noted and the investment in imported machinery is not expected to rise.

CONSTRUCTION DIVISION

Summary

Currently, there is little metric activity within the construction industry. This includes building and heavy construction and the specialty trades, i.e., plumbing and carpentry. While there was extensive discussion in the 1970's about conversion in the construction industry, there is little or no demand for metric standards or building materials by contractors today. A conversion schedule was prepared by the industry in cooperation with the ANMC, but the concensus of the associations and contractors contacted was that the schedule had been abandoned. There is a significant amount of metric activity among large, multinational contractors, but this activity is present only in their dealings with foreign clients. There is no indication that these firms consider the use of metric measurement in their domestic construction work. Several of the sources contacted are convinced of the cost-effectiveness of metric conversion, and believe that the country will eventually metricate. The prospects for conversion in the near future, however, are very slim.

ANMC - In April, 1983, a meeting of the original Construction Industries Coordinating Group (CICG) was held to review the status of metric transition. That group, represented by more than 20 federal and private sector organizations involved in construction, concluded that planning toward a consensus of the industry should begin again.

The DOD, on its own initiative, recently developed a design criteria manual for construction which establishes hard metric dimensions to be used in all domestic and foreign military installations.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MINING

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hyb~~rid~~	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	■

OTHER Introduction of metric machinery in mines

Laboratory analysis

	None	Pro	Anti
. FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: CONSTRUCTION

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	☐	☐	☐

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

MANUFACTURING - FOOD PROCESSING

Summary

The processed foods report includes foods and beverages manufactured or processed for human consumption. The food processing industry is soft-converting. A majority of the processed foods sold in the U.S. are dual-labeled. With the exception of beverages (especially soft drinks), few processed foods are packaged in hard metric. Almost all export foods are dual-labeled; the size of the packages is rarely altered from the domestic package size due to the cost of running two product lines and the pre-eminence of the domestic processed food market.

The wine and distilled spirit industry is hard metric. Their conversion was Federally mandated in the 1970's by industry request due to a proliferation of bottle sizes and foreign competition. Similar federal intervention is not currently foreseen for any other industry.

Soft conversion of the industry will continue. Hard conversion will be slow in appearing and will likely be coupled with the introduction of new products and packaging technologies.

ANMC - so-called "hard metric" aseptic packaging for fruit juices and milk are appearing in U.S. stores. Major food packagers such as Ocean Spray, Johanna Farms, Borden, Coca-Cola, Del Monte, and Shasta market juice in 1L, 250mL and 200mL containers and pouches. Individual 125g packages are also appearing.

MANUFACTURING - TOBACCO

Summary

U.S. tobacco product manufacturers produce metric length cigarettes with metric forming and sizing machinery and have done so for many years. However, other tobacco products such as snuff, cigars or pipe tobacco are produced and sold in customary units. Few additional conversions are anticipated for the near future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PROCESSED FOODS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid (CONVERSION)	Hard (CONVERSION)
TYPE OF METRIC ACIVIIY (IF ANY)	☐	■	■	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■ Pro soft conversion	■ Anti hard conversion

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

There is a medium degree of SI market penetration, but it is almost exclusively through dual-labeling food products.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TOBACCO

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	CONVERSION Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	■

OTHER COMMENTS

There has been a great deal of activity by cigarette manufacturers following their purchase of foreign metric cigarette forming equipment. All of the tobacco processing equipment and the packaging and forming of other tobacco products is customary.

MANUFACTURING-TEXTILE MILL PRODUCTS AND APPAREL AND OTHER FINISHED FABRIC PRODUCTS

Summary

There is no metric activity now in U.S. textile mill products (i.e., fabrics, carpets, and thread) or in apparel and other finished fabric products (i.e., clothing factories). There are conflicting opinions as to whether or not apparel manufacturers will eventually convert to metric, but the general consensus among industry sources is that no metric activity will occur in the near future.

MANUFACTURING-WOOD PRODUCTS

Summary

The wood products industry covers wood from growing and harvesting to production of basic wood commodities such as lumber and other wood products such as cabinets, structural members, and panel products. There is little metric activity in the wood products industries except where firms are exporting. Even in exporting, most wood products are made to customary dimensions. The U.S. is likely to become more interested in foreign markets for wood products over the next decade as the housing and construction market in the U.S. grows at a slow pace. This will lead to greater interest in metric production. However, the U.S. construction industry will continue to dominate domestic U.S. lumber and wood products producers' markets. They will continue to demand their products in customary units.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TEXTILE AND APPAREL

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

					CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard	
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	☐	

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☐	■	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: WOOD PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ■ Standards ☐ Labelling ☐ CONVERSION: Hybrid ☐ Hard ■

OTHER ____________________

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ■ Promote/active ☐

OTHER COMMENTS

Metric production primarily for export markets

MANUFACTURING - FURNITURE AND FIXTURES

Summary

There is little use of metric in production of furniture and fixtures in the U.S. This includes household, office, public building, and restaurant furniture, and office and store fixtures. Small amounts of metric hardware and machinery are imported. No increases in metric activity are expected in the future.

MANUFACTURING - PAPER

Summary

Currently, there is little metric activity in the paper production industry. The small amount that exists is related to production for export. The industry includes the manufacture of pulps, paper, paperboard, and related paper products. No increase in metric activity is expected within the paper industry for the near future.

MANUFACTURING - PRINTING, PUBLISHING, AND ALLIED INDUSTRIES

Summary

There is some use of imported metric designed printing machinery in the U.S., and use of chemicals packaged in metric quantities. There is no production of metric sized printing products, i.e. newspapers. The industry includes establishments engaged in printing and related services and in publishing printed matter, e.g., newspapers, books, etc.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: FURNITURE AND FIXTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
TYPE OF METRIC ACTIVITY (IF ANY)	Planning ☐	Standards ☐	Labelling ☐	Hybrid ■	Hard ☐

OTHER Some use of metric-capable machinery and metric-designed metal hardware.

FORMAL METRIC POLICY?	None ■	Pro ☐	Anti ☐

INDUSTRY VIEW ON METRIC	Divided ☐	Resist/ active ☐	Only if necessary ☐	Wait & see ■	Willing if market wants ☐	Promote active ☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PAPER AND ALLIED PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER Only for export

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

All activity in this industry is related to production of export-only paper products.

DIAGNOSIS OF METRIC SITUATION

DIVISION: **MANUFACTURING**

MAJOR GROUP: **PRINTING, PUBLISHING AND ALLIED INDUSTRIES**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐
Standards ☐
Labelling ☐
CONVERSION
Hybrid ■
Hard ☐

OTHER Some imported metric designed machinery that produces customary sized printed matter.

FORMAL METRIC POLICY?

None ■
Pro ☐
Anti ☐

INDUSTRY VIEW ON METRIC

Divided ■
Resist/active ☐
Only if necessary ☐
Wait & see ☐
Willing if market wants ☐
Promote active ☐

OTHER COMMENTS

Printing machinery is increasingly metric in design. For more information, see the summary on printing equipment.

MANUFACTURING - CHEMICALS AND ALLIED PRODUCTS

Summary

The chemical industry includes producers of basic chemicals and manufacturers of products by chemical processes, e.g., drugs, cosmetics, etc. The pharmaceutical industry has been metric for years due to international standards involving pharmacy goods. Bulk and specialty chemicals and plastic are largely metric. Other chemical products, e.g. paint, are dual-labeled. Finished chemical products, e.g. cosmetics are customary.

ANMC - In 1981, the ANMC Chemicals and Allied products Sector Committee, which includes representatives from the producers and users of bulk industrial chemicals, sought and received more than 70% agreement from the industry to establish 1984 as the date by which all bulk industrial chemicals would be shipped and billed in metric units.

MANUFACTURING - PETROLEUM REFINING AND RELATED INDUSTRIES

Summary

This summary covers petroleum refining and related industries, i.e., paving and roofing materials and miscellaneous petroleum and coal products. Also included in this summary are natural and bottled gas. Some companies in the oil and gas industry started converting gas pumps to litres in 1979. Almost all gas pumps have now been reconverted to customary due to customer preference. They could be readjusted to liters if conditions demanded. Production, refining and processing show low levels of metric activity and reluctance to change. According to industry sources, the pressure for international standards and possibly of tariff barriers, will force a conversion, though probably not before 1995. U.S. domination of the oil and gas industry ensures the use of customary units in the near future, even in overseas refineries. No metric activity is expected for petroleum and coal products in the next few years.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CHEMICALS AND ALLIED PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	■

OTHER ______________________________

____

	None	Pro	Anti			
FORMAL METRIC POLICY?	■	■	☐			
	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	■

OTHER COMMENTS

The pharmaceutical industry is metric and the bulk and specialty chemicals are largely metric. The rest of the industry is metricating slowly.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PETROLEUM REFINING AND RELATED INDUSTRIES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	☐

OTHER Measurement

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	■	☐

OTHER COMMENTS

A US dominated industry indifferent towards metrication. Retail sales converted to metric and back again, following price rise and fall.

MANUFACTURING - RUBBER

Summary

This summary includes establishments manufacturing rubber products. Passenger car and light truck tires have been converted to metric sizes. Heavy truck tires are in the process of converting. There is no metric activity in the rest of the rubber industry, e.g., in producing belts, hoses for appliances, or footwear for consumers, nor is any anticipated for the near future.

MANUFACTURING - LEATHER

Summary

There is no metric activity in the leather industry in the U.S., nor is any foreseen for the near future. The industry covers both leather tanning and finished leather products.

MANUFACTURING - CUT STONE AND STONE PRODUCTS

Summary

There is little metric activity in the stone industry in the U.S. This includes the cutting, shaping, and finishing of stone for building and other uses. Few increases in activity are expected for the future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING
MAJOR GROUP: RUBBER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIVIIY (IF ANY)	■	■	■	☐	■

OTHER Tires converted. Other rubber products are not.

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	■	☐

OTHER COMMENTS

The tire industry is very pro metrication. The rest of the rubber industry, however, will not convert until customer demand requires conversion.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANURACTURING

MAJOR GROUP: LEATHER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	☐

OTHER The planning occurred on an internal level. The domestic leather industry participated in the discussion, but did not adopt the conversion plan.

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CUT STONE AND STONE PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER Use of some metric-designed machinery

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

The SI penetration is in the form of hard-metric, dual-capable machinery. The availability of this machinery may result in limited metric activity in the future.

MANUFACTURING - STRUCTURAL CLAY PRODUCTS

Summary

There is no metric activity in the structural clay manufacturing industry in the U.S. This includes clay brick, tiles, refractories, etc. No activity is expected for the near future.

MANUFACTURING - GLASS

Summary

The industry includes manufacturers of flat glass, glass and glassware, and glass products. It also includes the manufacture of ceramic products. The glass container industry is committed to metric conversion and is moving toward that goal. There is little metric activity in production of flat glass for domestic use, but it is dual-labeled for export. The ceramics industry is committed to metric at the research level, but there is no metric activity at the manufacturing level. There is no use of metric in the production of tableware in the U.S.

MANUFACTURING - CONCRETE

Summary

There is little metric activity in the concrete industry at this time, nor is any expected in the near future. The concrete industry includes the manufacture of concrete products from cement and aggregate.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: STRUCTURAL CLAY PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	☐	☐	☐

OTHER ASTM clay standards are dual-labeled.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: **MANUFACTURING**

MAJOR GROUP: **GLASS (Part of STONE, CLAY, GLASS, AND CONCRETE PRODUCTS)**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
TYPE OF METRIC ACTIVITY (IF ANY)	Planning	Standards	Labelling	Hybrid	Hard
	☒	☒	☒	☐	☒

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	☒	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☒	☐	☐	☐	☐	☐

OTHER COMMENTS

Most of the activity noted above is in the glass container section.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CLAY, GLASS, STONE, CONCRETE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	■	☐	■	☐	☐	☐

OTHER COMMENTS

The exception to the above analysis of these industries is in glass beverage containers which are being manufactured to metric dimensions for wine and liquor and in the process of converting for soft drinks.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CONCRETE (Part of STONE, CLAY, GLASS, AND CONCRETE PRODUCTS)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

CONVERSION

TYPE OF METRIC ACIVIIY (IF ANY)

Planning	Standards	Labelling	Hybrid	Hard
■	■ (partially)	☐	☐	☐

OTHER ______________________________

____

FORMAL METRIC POLICY?

None	Pro	Anti
☐	■	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
■	☐	☐	☐	☐	☐

OTHER COMMENTS

MANUFACTURING - PRIMARY METAL INDUSTRIES

Summary

Primary metal industries include establishments engaged in smelting, refining, rolling, drawing, and alloying of ferrous and nonferrous metals and manufacturers of castings and other basic metal products. The primary metal industries are very active in metric in product areas that are tied to the automotive, earth moving and agricultural equipment, aerospace, and business machine industries. Examples of high volume basic metric steel products include steel sheet and plate and die casting (mostly captive automotive operations). The metric activity can be divided into products (metric according to customer request), factory process (which is typically customary involving conversion of the metric order to customary units for internal processing), and equipment (which is mostly dual-measurement capable and increasingly imported). Orders for metric products are expected to rise slowly. Internal factory processes, including paperwork and the actual manufacturing process, are converting to metric but at a much slower rate than the products. Equipment is increasingly imported and hard metric; however, even customary metalworking equipment is capable of producing metric products. The rest of the primary metals industry is mostly customary-only, with few prospects or desires to convert. The industry is geared to customer demand. Until customers outside of the automotive industry and the others listed above, begin to request metric products, the primary steel industry as a whole will not convert to metric.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PRIMARY METALS INDUSTRIES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER ______________________________________

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

The metric activity noted here is almost exclusively in supplying metal products to the original equipment manufacturing (OEM) industries, i.e., automotive industry. There is very little activity among primary metal manufacturers that do not supply the OEMs.

MANUFACTURING - FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND TRANSPORTATION EQUIPMENT

Summary

Fabricated metals include the fabrication of ferrous and nonferrous metal products (i.e. general hardware), fabricated structural metal products, and a variety of metal and wire products. There is very spotty metric activity within the fabricated metals industry. Extensive activity exists in metal fasteners; some activity persists on the national industry level, although at lower levels than in the 1970's; and some activity appears in dual labelling and converting of standards for metal lath and steel framing, reinforced steel, small arms and ammunition, expanded metals, and metal buildings. All activity noted in fabricated metals was tied to existing customer demand for metric products, e.g. metric fasteners, or perception of future demand. The expected future demand, for the most part, has not materialized for the majority of the industry. Few changes, except for primary suppliers of the automotive industry, are expected for the next few years.

DIAGNOSIS OF METRIC SITUATION

DIVISION: **MANUFACTURING**

MAJOR GROUP: **FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND TRANSPORTATION EQUIPMENT**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIVIIY (IF ANY)	■	■	■	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

The metrication of this industry is directly tied to the conversion of customer industries. Suppliers of the automotive industry, for example, have a high degree of metric activity and metric parts. The most noteable example is fastener manufacturers.

MANUFACTURING - MACHINERY, EXCEPT ELECTRICAL

Summary

This major group includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment and transportation equipment. This consists of engines and turbines; farm and garden machinery and equipment; construction, mining, and materials handling machinery and equipment; metalworking machinery and equipment; special industry machinery such as textiles, food, paper, wood, printing; general industrial machinery and equipment such as pumps, compressors, fans, etc.; office, computing and accounting machines; and refrigeration and service industry machinery.

An association representing most of the capital goods industry in the U.S. reports a wide range of metric activity in machinery manufacturing. This is verified by contacts representing specific areas of that industry. In general, companies that are large, internationally oriented, and leaders in their industry have converted or are in the process of converting their products to metric. The prevalent motivation for this appears to be to achieve economies of scale through uniform worldwide operations, interchangeability of parts and ease of exchange of drawings. Industries which are not converting to metric are primarily made up of small companies supplying the domestic market where there is no customer demand for metric machinery.

Industries which are heavily involved in metric activity include: heavy construction and farm machinery, suppliers of engines and industrial patterns to those manufacturers, and computing machinery. According to one trade journal, most engine manufacturers are producing metric products. This is in response to the demand from automobile and truck manufacturers, and heavy construction and farm machinery manufacturers. Drawings and designs are based on metric with customary equivalents added. Sales literature utilizes metric dimensions. Major corporations are also manufacturing metric steam generators and hydroturbines for utilities.

In heavy machinery for construction and farming, conversion is about 50% according to an industry manufacturers association. A major manufacturer interviewed indicates that conversion is well established with 75-90% of their drawings in metric and 75-90% of the parts produced in metric gauge. Two of these manufacturers have begun production, within the last year, of metric diesel engines. The availability of metric capable machinery, use of more foreign machinery and a growing interest in export markets are promoting the use of metric, according to one of these producers. In addition, technical regulations with regard to imports in other countries are a barrier to the export of customary designed machinery.

In computing machinery, the status of metric conversion is slightly different. One large international leader in the industry has achieved 100% conversion of new products, while other large, international firms have not begun to convert. The feeling was expressed by one of these firms that their international business may eventually require conversion. Again, economies of scale were mentioned in this regard. One large multi-product firm's overall policy is that divisions should convert individually when necessary. One printer division decided to convert to metric because a significant portion (25-30%) of their business was with the European Economic Community.

Overall, the machinery industry is well on its way to converting its products and processes to metric.

ANMC - At the request of the Department of Defense (DoD), ANMC's Machinery Sector Committee is establishing priorities for metric conversion of machinery standards of selected DoD supply classes. Initially, several thousand standards have been identified for further analysis on the degree of measurement sensitivity, absolescence of the basic equipment, new procurement, and other factors.

Details of conversion in specific machinery industries are covered in the following ten summaries.

DIAGNOSIS OF METRIC SITUATION

MANUFACTURING

DIVISION: MACHINERY, NOT ELECTRICAL

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIIVIIY (IF ANY)	■	■	■	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	■	■	☐	■	■

OTHER COMMENTS

The degrees of metric activity past, present, and future vary widely depending on type of machinery. For more information, see specific diagnoses.

1. ENGINES AND TURBINES

Summary

Engines and Turbines includes establishments primarily engaged in manufacturing steam, gas, and hydraulic turbines and turbine generator set units, and internal combustion engines. According to one journal, most manufacturers of engines are producing metric products. This is confirmed by the leading automobile manufacturer, whose engines are metric, except for a few older models still in production, and by a large construction machinery manufacturer who uses metric engines. An international manufacturer of turbines has been producing a hard metric hydro-turbine for several years. The conversion to metric in engines will continue as new products are designed, led by large manufacturers with international markets.

2. FARM MACHINERY

Summary

Farm machinery includes establishments primarily engaged in manufacturing farm machinery and equipment, including wheel tractors for use in preparation, planting, and harvesting of crops and for performing other farm operations and processes. A majority of U.S. heavy farm machinery and equipment is designed and manufactured in hard metric. This conversion began in the 1970's, led by large, internationally-oriented firms and is accomplished product by product. It wil continue as new products are developed. However, the momentum has slowed because of a recession in this industry. Small, domestic-oriented manufacturers of farm machinery use customary measurements in their designs and production. Unless customer demand changes or individual companies decide to pursue the export market, these products will remain customary.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY -- ENGINES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

				CONVERSION	
TYPE OF METRIC ACTIVITY (IF ANY)	Planning ☐	Standards ☐	Labelling ☐	Hybrid ■	Hard ■

OTHER ____________________

____

FORMAL METRIC POLICY?	None ☐	Pro ■	Anti ☐

INDUSTRY VIEW ON METRIC	Divided ☐	Resist/ active ☐	Only if necessary ☐	Wait & see ☐	Willing if market wants ☐	Promote active ■

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, FARM

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	☐	■	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	■

OTHER COMMENTS

3. CONSTRUCTION, MINING, MATERIALS HANDLING

Summary

The construction machinery industry includes manufacturers of heavy machinery used by the construction industry. The large international firms are converting to metric, while the small domestic firms are not. The reasons for conversion center around the desire for uniformity throughout their worldwide operations, which leads to economies of scale. Conversion in construction equipment will continue, led by these large international manufacturers. The current recession in construction will inhibit that conversion, however. In the mining machinery industry no industry-wide move towards metric is noted. U.S. mining equipment manufacturers design and produce customary machinery. A small amount of metric machinery has recently been purchased from Europe and Japan, but because of the slowdown in the industry, equipment purchases are not expected to increase noticeably.

4. METALWORKING MACHINERY AND EQUIPMENT

Summary

The machine tool industry is gradually converting to metric. The machine tool industry includes companies that make metal forming and cutting machinery as well as tools, dies, jigs, and other perishable cutting and forming tools. At present, about 10% of machine tools being sold are capable of producing in both metric and customary units. Very few machine tools are designed in metric units. Fixtures, tools, and dies account for between 10% and 25% of the industry's sales. The major customers for these metric tools and metric capable machines are the automotive and other transport equipment industries as well as companies producing products for the military. The momentum for converting machine tools designed in customary units is low. The momentum for metricating dies and fixtures is low given the slow pace of conversion in the customer industries.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY: CONSTRUCTION, MINING, MATERIALS HANDLING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☒	☒

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	☒	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☒

OTHER COMMENTS

The exception to the above analysis is the mining industry machinery, which has a very low level of metric conversion activity and none is forecast.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, METALWORKING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

CONVERSION

TYPE OF METRIC ACTIVITY (IF ANY): Planning ■ Standards ■ Labelling ☐ Hybrid ☐ Hard ■

OTHER ______________________________

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ■ Promote/active ☐

OTHER COMMENTS

5. FOOD PRODUCTS MACHINERY

Summary

Food products machinery includes machinery used for preparation, canning, or packaging of food and beverages. U.S. produced machinery is mostly customary. However, in some industries, part of the machinery is purchased from foreign countries and is hard metric, e.g., 10% of biscuit and cracker machinery is imported hard metric. Most of the equipment is labeled with customary equivalents. A few firms, i.e. canners, produce hard metric equipment for export. The soft-drink industry is using metric machinery for production of flexible metric containers. Metric conversion is occurring in the soft drinks industry, but is not likely to increase in other food processing machinery.

6. PAPER MACHINERY

Summary

Paper, pulp, and paper products manufacturing machinery has some metric activity. Some paper manufacturers are importing machinery from Scandanavia, however, it is designed to U.S. customary standards. The larger companies do a heavy export business (up to 40% of their business) and make metric machinery for that market. Machinery manufactured for domestic use is designed in customary measurements. The packaging machinery business expects metric production to increase due to their large export market. Other paper producing machinery is not likely to increase conversion activity because of lack of customer demand.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, FOOD PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

CONVERSION

Planning ☐ Standards ☐ Labelling ■ Hybrid ☐ Hard ☐

OTHER ______________________

FORMAL METRIC POLICY? None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Promote/active ☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, PAPER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

7. PRINTING MACHINERY

Summary

The printing equipment industry, association sources claim, exports 30-35% of their production. Printing machinery is used for printing and bookbinding. Some of these machines are hard metric and some are dual-labeled. Imported machinery is in hard metric. As most of the machinery will produce in either customary or metric, demand does not depend on whether or not a machine is metric but rather on other factors which determine a source of supply.

8. MISCELLANEOUS SPECIAL INDUSTRY MACHINERY

Summary

This section includes several categories of machinery, not covered elsewhere: textile machinery, tobacco products machinery, plastics machinery, stone machinery, amusement machinery and air conditioning and refrigeration machinery. The major metric activity among these groups is in tobacco products manufacturing which converted to metric many years ago. Major manufacturers use metric machinery purchased from Europe for the actual production of cigarettes, filters, makers, tippers, conveyors, packers, etc. The processing of the tobacco is done by customary machinery manufactured in the U.S. Manufacturers predict that ultimately all production will be done by metric machinery; U.S. manufacturers of machinery are resisting conversion. Coin operated amusement devices, is showing a definite trend toward conversion. This trend was lead by the introduction of metric video games in this country. What has evolved, is that manufacturers who produce the video games also produce other coin-operated devices such as pool tables, music machines, etc. Although those machines are still mostly customary, the manufacturers are steadily introducing metric parts in order to simplify their operations. The metrication will continue in the future. A lot of plastics machinery is imported and is in hard metric, although there is reluctance on the part of machinery manufacturers to think metric. Conversion is occurring slowly because of demand for metric parts by GM. In tone fabricating and quarrying, customary measurements are used; some machinery (drills, grinders, splitters, saws) are designed to hard metric. If the building industry converts, the stone making industry will likely follow, but that is not predicted now. Commercial air conditioning and refrigeration equipment is manufactured in the U.S. in customary measurements. Standards include dual listings and exporters publish literature in converted terms, when necessary. Noticeable future conversion is not predicted. Textile machinery is almost entirely manufactured in the U.S. and is not metric. Since it is felt by the industry to be expensive to convert, and since the textile industry is in a state of recession, no increase is expected in export markets and hence no increase in the manufacture of metric textile machinery is foreseen. Where the textile machinery used in the U.S. is imported, it is in hard metric. A contact in South Carolina suggests that there is a substantial amount of German and Swiss textile machinery in the industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, PRINTING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	■	☐

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY: MISCELLANEOUS SPECIAL INDUSTRY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	■	■	☐	☐	☐

OTHER COMMENTS

There is extensive metric activity in the production of tobacco and amusement devices machinery. The other sectors have much less activity.

9. GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT

Summary

General industrial machinery includes items such as pumps, bearings, compressors, blowers and fans, industrial patterns, gears and mechanical power transmission equipment. Metric conversion in general industrial machinery and equipment varies among the different industries. Activity in fluid power products is limited to soft metric drawings with some hard metric as requested by customers. A compressor manufacturer uses customary components with the air end designed in metric. Fans and blowers are manufactured in the U.S. in customary units. Air conditioning and refrigeration equipment is manufactured in customary units. Industrial patterns are made in both customary and metric. Metric is used for auto and heavy machinery manufacturers who have converted. The gear industry is not advocating conversion to metric. Industrial heating equipment is manufactured in customary, usually, with occasional request for dual-labelling. Some industrial machinery manufacturers are responding to demand for metric equipment from large, international corporations. This is seen in industrial patterns and gears. But the percent of metric production is small and indicates only a slow trend towards metric conversion. Metrication is expected to continue slowly in the general industrial machinery and equipment industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, GENERAL INDUSTRIAL

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	■	☐	☐	■	☐

OTHER COMMENTS

10. COMPUTER AND BUSINESS MACHINERY

Summary

The computer and business machinery industry is divided in their use of metric, though not along the lines of international and domestic business. One multinational corporation and leader in the field is 100% metric in its production at this time, while other large, multinational corporations are not producing any metric products. Some pressure is being felt by these firms and the concensus is that they will have to seriously consider development of a metric product in order to achieve economies of scale in international operations. Other large producers have converted some product lines, but not others. Metric conversion is likely to continue, led by the industry leader, because other international corporations are feeling the need for uniformity of operations throughout the world.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, COMPUTER & BUSINESS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	CONVERSION Hybrid	 Hard
■	■	■	■	■

OTHER ____________________

____

FORMAL METRIC POLICY? None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
■	☐	☐	☐	☐	☐

OTHER COMMENTS

MANUFACTURING - ELECTRICAL AND ELECTRONIC MACHINERY

Summary

Electrical and electronic machinery includes electric transmission and distribution equipment, electrical industrial apparatus, household appliances, radio and television equipment and commlunication equipment. Electrical units have always been referred to in metric terms, but this does not carry over into equipment. Standards are written with dual dimensions when they are revised but equipment such as motors, controls, welding apparatus and carbon/graphite products are still dimensioned in inches. Home appliances in the U.S. are manufactured entirely in customary dimensions. In the radio/television industry, engineering work has always used metric. A major manufacturer has converted to metric because they obtain parts from the Far East. This conversion will continue as new products are developed. Conversion in electrical apparatus is not likely to occur soon because of the many, varied complex codes and tests involved throughout the U.S. However, cutbacks in the building of power plants in the U.S. is encouraging some large manufacturers of power equipment to seek business overseas. This will, in the long run, promote metric conversion.

MANUFACTURING - TRANSPORTATION EQUIPMENT

Summary

Metric activity varies in the transportation equipment industry from the extensive use of metric in motor vehicles and trucks to no metric in ships and railroad stock. Bicycles have some metric parts and campers will be following the motor vehicle/truck industries. Prospects for conversion of motor vehicles and trucks are very favourable. The rest of the transportation equipment industry will be slower to convert.

ANMC - Major U.S. automobile manufacturers design and produce their cars in metric. GM completed its metric transition program in 1982; Ford will be predominantly metric by 1985; Chrysler cars are about 70% metric, and American Motors cars about 20%.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, ELECTRICAL & ELECTRONIC

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐ Standards ■ Labelling ☐ CONVERSION: Hybrid ☐ Hard ☐

OTHER ____________________

____

FORMAL METRIC POLICY?

None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC

Divided ■ Resist/ active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promote/ active ☐

OTHER COMMENTS

The industry is mixed with low activity in electrical apparatus and high activity in electronic products.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TRANSPORT EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	☐	☐	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

This industry has been active in preparing for metric conversion should it be desired by the customer. It is also monitoring the status of conversion in aircraft. However, very few people see the potential for the development of civilian metric aircraft given the opposition of the major U.S. airlines.

MANUFACTURING - AIR TRANSPORT EQUIPMENT AND PARTS

Summary

The air transport equipment industry includes large commercial transports, helicopters, general aviation aircraft, and other assorted products such as aircraft parts and engines. We also include in this category missiles and spacecraft. With the exception of missiles and space craft there is little metric activity among U.S. producers of air transport equipment. The U.S. has dominated the world aerospace industry for several decades. As a result its standards and practices have become the worldwide standard. While this is changing as foreign companies increase production, there is little pressure for U.S. aircraft producers to convert to metric. In fact, the major customers for U.S. commercial transports, the U.S. airlines, actively oppose the development of metric aircraft. The extensive system of spare parts, ground equipment, and tools asssociated with these airlines' operations is all in customary units. The major force for metric conversion of aircraft will come from the Department of Defense or from the development of superior foreign designs which are in metric dimensions. While the U.S. is unlikely to produce new aircraft in metric dimensions in the near future, the aircraft standards are being converted. The military's emphasis on metric is most pronounced in the missiles and spacecraft area. Yet even there, only a few missile systems are produced in metric units.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TRANSPORT EQUIPMENT - MILITARY AIRCRAFT, GUIDED MISSILES AND SPACE VEHICLES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	CONVERSION Hybrid	CONVERSION Hard
☐	■	☐	☐	■

OTHER Department of Defense Procurement procedures are changing to increased use of metric in design of weapons systems

FORMAL METRIC POLICY?

None	Pro	Anti
☐	■	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
☐	☐	☐	☐	■	☐

OTHER COMMENTS

There are several missile systems and space vehicles that are metric - either completely or substantially. Military aircraft are less likely to be metric at present. Pressures for interoperability with NATO nations and for international production are increasing the momentum of conversion in this sector.

MANUFACTURING - MEASURING, ANALYSING, AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS; WATCHES AND CLOCKS

Summary

Scientific and measuring equipment includes manufacture of instruments and related sensors and accessories used for measuring, testing, analyzing, and controlling.

The development of digital readout systems has enabled many manufacturers of control and measurement equipment to offer metric measurement without converting the internal and external dimesnions of their products. For many, this has removed any pressure to make further changes. Optical equipment, designed around metric lenses, has long been produced to metric specifications. Segments of manufacturing and practice still await conversion. For the most part, however, the industry feels that adequate conversion has occurred and does not plan further metrication activities.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: SCIENTIFIC EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	CONVERSION Hybrid	 Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

Photographic less pro-metric than other areas.

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	■	■

OTHER COMMENTS

Electronics have made soft conversion easy and practical.

TRANSPORTATION, COMMUNICATIONS, ELECTRIC, GAS AND SANITARY SERVICES DIVISION

Summary

This division includes establishments providing to the general public or to other business enterprises passenger and freight transportation, communication services, electricity, gas, steam, water or sanitary services. Metric activity in this division is occurring in the area of communication, including telephones, telegraph, radio and TV broadcasting. The Federal Communications Commission (FCC) is providing the impetus through soft conversion of regulations and the availability of dual standards. (See the government report for more information on FCC activity.) Both measurement systems are presently in use. There is no evidence of metric activity in other transportation industries such as railroads, highways, shipping and freight/warehousing. An air transport association that keeps in close touch with developments in metric reports an anti-metric feeling from the air transport industry due to transition period, duplication, and cost of retooling. Double standards in air transportation are operating in many countries. The electric utility industry takes the position that they will support an orderly conversion effort. A recent survey by a metric committee within that industry indicates that conversion is at a very low level. There is a smattering of metric equipment within the utility industry, usually produced overseas. There is no metric activity in the natural gas transportation industry at this time. Metric activity in the sanitation industry is restricted to some dual labelling of designs for domestic sanitary facilities and metric drawings for foreign work. Since metric conversion in the transportation industries seems to be mostly a non-issue, little progress is predicted in conversion efforts.

DIAGNOSIS OF METRIC SITUATION

DIVISION: TRANSPORTATION, COMMUNICATIONS, ELECTRIC, GAS AND SANITARY SERVICES
MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	☐	☐	☐

OTHER ________________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	■	☐	☐

OTHER COMMENTS

WHOLESALE - DURABLE

Summary

In regard to durable goods there is little available knowledge of or interest in metric measurements at the wholesale level. These products include furniture, lumber, jewelry, etc. Wholesalers generally follow the lead of the manufacturers. Where products are manufactured in metric (usually exports/imports), wholesalers carry and sell them.

RETAIL - BUILDING MATERIALS, HARDWARE, GARDEN SUPPLY and MANUFACTURED HOUSING

Summary

There is no metric activity in building, hardware, garden supply, and manufactured housing (mobile home), nor is any expected in the near future.

RETAIL - GENERAL MERCHANDISE STORES

Summary

The retail general merchandise stores (i.e., sellers of apparels, furniture, dry goods, etc.) are not presently concerned with metric issues. There is no activity on their part to promote or monitor metric usage. Products are sold as the customer demands them. Generally, some imported products are designed and manufactured in metric and almost all U.S. manufactured products are designed and manufactured in customary sizes.

DIAGNOSIS OF METRIC SITUATION

DIVISION: WHOLESALE

MAJOR GROUP: DURABLE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

☐ Planning ☐ Standards ☒ Labelling — CONVERSION: ☐ Hybrid ☒ Hard

OTHER ______________________

____

FORMAL METRIC POLICY? ☒ None ☐ Pro ☐ Anti

INDUSTRY VIEW ON METRIC ☐ Divided ☐ Resist/active ☒ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promot active

OTHER COMMENTS

Automobile parts distributors sell metric parts. Photographic lenses are in metric. With these exceptions, wholesalers have little concern or knowledge of whether their products are metric.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: BUILDING MATERIALS, HARDWARE, GARDEN SUPPLIES, AND MOBILE HOME DEALERS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER None

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	■	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: GENERAL MERCHANDISE STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER Sell metric products as demanded by customers.

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☒	☐	☐	☐

OTHER COMMENTS

RETAIL - FOOD STORES

Summary

There is very little metric activity in retail food stores, beyond the selling of dual-labelled food products. No industry-wide metric discussions or metric conversion plans are expected in the near future.

RETAIL - AUTOMOTIVE DEALERS AND GASOLINE SERVICE STATION

Summary

This report covers retail dealers selling new and used automobiles, boats, trailers, motorcycles and their related parts, and gasoline service stations. Both automobile dealers and gasoline stations are concerned about metric considerations due to their servicing and selling of metric automobiles. Requirements for metric training and new tools are not seen as presenting any problems to automobile dealers or service stations. Following California's lead there was an attempt by some gasoline service stations, especially in the Northwestern states, to convert their pumps to metric in 1979. These stations have largely reconverted to customary. Gradual increases in metric use are expected, led by conversion in the automobile industry.

RETAIL - APPAREL AND ACCESSORY STORES

Summary

There is no metric activity in ready-to-wear apparel at the retail level. This includes retailers of articles for personal wear and adornment, i.e., cothing. No activity is expected in the future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: FOOD STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRA[illegible]N			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	☐

OTHER (Planning was largely in past.)

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

Food stores stock and sell dual-labeled foods and a few hard metric packaged foods, e.g. some cereals and soft-drinks. Metric planning activity for conversion of weights (scales) is very low to non-existent.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: AUTO DEALERS, GASOLINE DEALERS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	CONVERSION Hybrid	CONVERSION Hard
☐	☐	☐	■	■

OTHER ______________________________

FORMAL METRIC POLICY?

None	Pro	Anti
■	☐	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
☐	☐	☐	☐	■	☐

OTHER COMMENTS

Activity is tied to the automobile industry. As the automobile industry metricates, the services (sale of cars and repair) of these groups will also metricate.

Metrication of gasoline pumps will be slow due to customer resistance.

DIAGNOSIS OF METRIC SITUATION

DIVISION: **RETAIL**

MAJOR GROUP: **APPAREL AND ACCESSORY STORES**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

☐ Planning ☐ Standards ☐ Labelling

CONVERSION

☐ Hybrid ☐ Hard

OTHER NONE.

FORMAL METRIC POLICY?

■ None ☐ Pro ☐ Anti

INDUSTRY VIEW ON METRIC

☐ Divided ☐ Resist/ active ■ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promot· active

OTHER COMMENTS

RETAIL - FURNITURE, HOME FURNISHINGS and EQUIPMENT STORES

Summary

There is no metric activity in retail furniture, home furnishings or equipment stores. No activity is expected in the near future.

FINANCE, INSURANCE, REAL ESTATE

Summary

Metric activity in the finance, insurance and real estate division is practically non-existent. The finance industry deals mostly in dollars where use of metric measurements would seldom apply. The exception, as in many other U.S. industries, is in dealings with foreign countries when the metric system may be used for quoting certain imported commodities. The insurance and real estate areas, though often dealing with measurements and weights, rarely have need to use metric measurements. No increase in metric activity is expected within these sectors in the near future.

ANMC - A large life, accident, health, auto, liability, commercial and personal insurance company reports that metric measurements are used in three areas within the company. These are industrial hygiene, toxic chemical measurement of hazardous substances, and loss control engineering in plant inspection, consumer liability, and occupational safety and health measurement.

SERVICES - HOTELS, ROOMING HOUSES, CAMPS, and OTHER LODGING PLACES

Summary

There is no metric activity in the hotel service industry, nor is any anticipated in the near future. The industry covers lodging establishments, camps, and trailer parks.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: FURNITURE, HOME FURNISHINGS, AND EQUIPMENT STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	CONVERSION Hybrid	Hard
☐	☐	☐	☐	☐

OTHER None

FORMAL METRIC POLICY?

None	Pro	Anti
■	☐	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
☐	☐	■	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: FINANCE, INSURANCE, AND REAL ESTATE

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER There is limited metric quoting of certain imported commodities within the financial sector.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: HOTEL SERVICES (SIC MAJOR GROUP 70)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER A report on metrication was prepared -- no subsequent action taken.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☐

OTHER COMMENTS

SERVICES - PERSONAL SERVICES

Summary

Personal services include laundry services, photographic studios, beauty and barber shops, shoe repair, and funeral services. There is little metric activity in the personal services industry. With the exception of photographic studios, no metric activity is expected in the near future.

SERVICES - BUSINESS SERVICES

Summary

The business services division covers establishments rendering services to businesses on a fee or contract basis. It includes advertising, collection, and mailing services; management and maintenance services; new syndicates; data processing; and miscellaneous services, e.g. research and development and photo finishing services. With the exception of R&D activities, data processing, and photo finishing services, there are no metric activities within business services. Research and development laboratories are predominantly metric and have been for years. Within the photofinishing and data processing industries, there were discussions of converting and there is some use of metric products today. With the exception of data processing, there are no increases in metric activity expected for any of these sectors over the next few years.

SERVICE - AUTOMOTIVE REPAIR, SERVICES AND GARAGES

Summary

The auto repair industry, including rental leasing of cars, and parking services, is increasingly dealing with metric as automobiles are converted to metric. This metrication process will continue, tied to conversion of the automobile industry.

DIAGNOSIS OF METRIC SITUATION

DIVISIÓN: SERVICES

MAJOR GROUP: PERSONAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	☐

OTHER The only metric activity found in this sector is within photograp~~hic~~ studios. They use some metric products, but their services are basically customary.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☐	■	☐	☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: BUSINESS SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☒	☐	☐	☐	☒

OTHER Planning took place in the 1970's -- very little today. The only hard metric is for scientific applications, e.g. R&D and other laboratories.

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☒	☐

OTHER COMMENTS

The momentum of conversion varies across sectors. For most, it is non-existent. There is some change within data processing and related services tied to metrication of supplies and equipment. R&D laboratories are predominantly metric, therefore there is no momentum for conversion expected for the future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: AUTOMOBILE REPAIR

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIVIIY (IF ANY)	☐	☐	☐	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot- active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

SERVICES - MOTION PICTURE SERVICES

Summary

The Motion Picture Service Industry includes production and distribution of motion pictures, allied services, and theaters. The industry uses a metric hybrid. Most of the equipment and materials used to produce and develop motion pictures are hard metric. The services related to motion pictures and the manner in which the equipment is used is strictly customary. Services are gradually moving toward metric, but the transition is very slow, and will, at best, come with the next generation of cameramen, cinematographers, etc.

SERVICES - AMUSEMENTS AND RECREATION SERVICES, EXCEPT MOTION PICTURES

Summary

This industry includes establishments engaged in providing amusement or entertainment on payment of a fee or admission charge. U.S. athletic events use metric measurements in some swim meets and track and field events. This is especially true where the athletes are likely to be training for international competition. Where there is no involvement in international events, interest in metric is decreasing in the U.S. The National Collegiate Athletic Association (NCAA) is no longer attempting to convert. Olympic events are measured entirely in metric.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: MOTION PICTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	■	■	■

OTHER This activity is mostly related to products.

Almost no activity is taking place with the service

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	■

OTHER COMMENTS

Metric activities in the motion picture industry should be discussed in two contexts: equipment/materials and services. The equipment/materials have included hard metric for over a decade; the services, however, are almost exclusively customary. There is little or no momentum in the services to metric today or in the near future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: AMUSEMENTS AND RECREATION SERVICES, EXCEPT MOTION PICTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	■

OTHER COMMENTS

Activity within coin-operated amusement devices will continue at very high levels. Activities in sports and recreation, however, are declining from their previous high levels of metrication.

SERVICES - HEALTH SERVICES

Summary

Health services include establishments primarily engaged in furnishing medical, surgical, and other health services to persons. Metric use is relatively advanced in health services, an industry which has made progress towards an international standard of measurement, using SI units. The pathology laboratories and pharmacies measure in metric and drugs are sold in hard metric quantities. A patient's weight, height and temperature are generally measured in pounds, inches and degree Farenheit. Several hospitals have studied the possibility of further conversion (height, weight and temperature, metric sizing in beds, rooms) and some have carried out some of these changes. Aggressive conversions of entire hospital systems are not expected. Piecemeal adaptations will continue.

SERVICES - LEGAL AND SOCIAL SERVICES

Summary

Legal services, which include establishments offering legal advice or services, designed a Uniform Metric System Procedures Act which was promulgated to the states in 1979 and prescribed a system for correcting state statutes and regulations for weights and measures which possessed statutory, but unintended impediments to metric conversion. It has not been adopted by any states. Association representatives claim lack of adoption is due to reduced Federal Government interest in metrication and because conversion has not been common in U.S. industry. Future use of this act and the involvement of the legal profession depends on further conversion in industry. Social services includes establishments providing the social and rehabilitation services. There is no reference to metric systems in this profession. Conversion is not expected to occur within social services.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: HEALTH

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER Education

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	■

OTHER COMMENTS

Metric activity is high because of use by the medical profession. Momentum for complete conversion remains at medium because of the perceived difficulty of interpreting metric to patients and the cost of converting hospital construction, and equipment.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: LEGAL AND SOCIAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER NONE.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

SERVICES - EDUCATIONAL

Summary

Educational services include establishments furnishing formal academic or technical courses, schools, and libraries. The U.S. educational system was deeply involved with promoting metric in education until about the end of 1981, when many activities ended and interest leveled off. Metric education in elementary, junior and high schools is now institutionalized but in a patchwork fashion across the country. Textbooks by major publishers have been revised to include metric only or metric and customary units. Progress in metric engineering education has been uneven depending on the field of engineering and the school. Vocational education has expanded to include both metric and customary units in areas where industrial conversions have occurred, i.e. automotive repair and health occupations. Pressure from industry, government, and the professions will be necessary for further conversion to occur. At this time, continued low levels of metrication activity are expected in the future.

SERVICES - MUSEUMS, ART GALLERIES, BOTANICAL and ZOOLOGICAL GARDENS

Summary

This category of services involves the non-commercial operation of museums, art galleries, and gardens. Hard metric is frequently used in measuring paintings and labelling museum exhibits. Dual labelling is frequently used in the literature and in the labelling of exhibits at museums, zoological parks and aquariums. Use of metric is expected to increase in the near future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: EDUCATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■	■		
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIIVIIY (IF ANY)	■	■	☐	■	■

OTHER Teaching, Training

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	■

OTHER COMMENTS

Early enthusiasm subsided, current activity patchy

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: MUSEUMS, ART GALLERIES, BOTANICAL AND ZOOLOGICAL GARDENS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	■	■	■

OTHER Education

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote, active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	■

OTHER COMMENTS

SERVICES - EATING AND DRINKING PLACES

Summary

There is little metric activity in the eating and drinking places industry. While wine and distilled spirits are packaged in metric bottles and restaurants occasionally use metric designed equipment, the people who work in these establishments are familiar with working in customary measures. No activity is expected in the near future.

DIAGNOSIS OF METRIC SITUATION

DIVISION: **SERVICES**

MAJOR GROUP: EATING AND DRINKING PLACES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER **NONE**

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	■	■	☐	☐	☐

OTHER COMMENTS

CHAPTER III

STATUS OF METRIC ACTIVITIES IN THE UNITED STATES GOVERNMENT

This Chapter presents the results of the survey of metric activities in the policies and programs of the U.S. government. The material is presented in alphabetical order by agency, with the exception of the initial presentation dealing with the Inter-Agency Committee on Metric Policy and the Metric Operations Committee. These two are the key groups for tracing metric activities in the U.S. government.

The summary diagnostic charts are included following the written summaries. For more detailed results see appendicies B and G.

INTERAGENCY COMMITTEE ON METRIC POLICY
DEPARTMENT OF COMMERCE

Summary

The central policy making body of the Federal Government regarding the issue of metric conversion, is the Interagency Committee on Metric Policy (ICMP). The committee consists of high level policy officials from the major agencies in the Federal Government. The Metrication Operating Committee (MOC) of the ICMP does most of the substantive work on metric policy. The ICMP often ratifies decisions made by the MOC. After a brief hiatus following the demise of the U.S. Metric Board (USMB), the ICMP and MOC have been reactivated. Most notably, the ICMP has recently approved the proposed change in Federal Standardization Policy to accept the use of metric measurements in Federal standards (see GSA summary).

The relationship of the ICMP to private sector organizations such as the American National Metric Council (ANMC) is ambiguous. ANMC has no official position on the MOC. Specifically, ANMC works closely with MOC especially the Industry Liaison Committee of the MOC. At present, ANMC has no official position on the ICMP though they are often invited guests at ICMP meetings. At the most recent meeting they gave a presentation on their activities and the status of conversion in the U.S. The Office of Metric Programs can furnish information on ICMP or MOC activities. It is the secretariat for both committees.

The following attachments included in Appendix G, give some more information on the ICMP and the MOC:

- Organization Chart
- Press releases from ICMP Meeting of September 1, 1983
- MOC Minutes of January 18, 1983 meeting
- ICMP 1982 Annual Report
- ICMP 1981 Annual Report

U.S. DEPARTMENT OF AGRICULTURE (USDA)

Summary

Metric has not received much attention at the Department of Agriculture in recent years. Most of the existing activity has focused on the reporting of crop statistics. Interest may be increasing with the recent reorganization of the USDA which places metric activity under the Assistant Secretary for Science and Education. The metric policy of USDA is being redrafted with an emphasis on toning down the aggressive pro-metric language of the previous policy.

GOVERNMENT: DEPARTMENT OF COMMERCE (DOC)

Summary

The metric activities of the Department of Commerce (DOC) changed significantly over the past year with the demise of the U.S. Metric Board and the creation of the Office of Metric Programs (OMP) within the Department of Commerce. OMP works to counter the public perception of a decline in the importance of the metric issue. It has also revived the Interagency Committee on Metric Policy (ICMP) as well as identified potential obstacles to the use of metric measurements posed by Federal regulations or standards. OMP anticipates focusing more of its activity in the coming years on metric in international trade and in developing a means of assissting the status of metric in the U.S. through the use of Department of Commerce industry analysts and private sources. They are currently directing research on the role of metric in U.S. exports. There is little prospect of increasing support for the OMP beyond its current modest budget and personnel allocation.

DIAGNOSIS OF METRIC SITUATION

AGENCY: U.S. DEPARTMENT OF AGRICULTURE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	■	☐

OTHER Reporting crop statistics

	None	Yes	
FORMAL METRIC POLICY?	☐	■	(being revised)

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF COMMERCE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	■	☐

OTHER Office of Metric Programs

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

DEPARTMENT OF DEFENSE (DOD)

Summary

The Department of Defense (DOD) has been one of the most active Federal agencies regarding the metric issue over the past several years. As a result, the procedures for using metric products and services in the military services and the other Defense agencies are established or being established. However, implementation of the procedures has not kept pace with initial expectations. DOD is giving renewed emphasis to metric conversion and expects more activity in the near future. This will be especially true of defense systems based on foreign designs or intended for extensive use in NATO countries. The goal of this activity is to promote interchangeability and interoperability of equipment and materiel with our allies, facilitate joint production programs and simplify supply operations. DOD must pace its conversion efforts to thosein private industry in order to ensure technical and economic feasibility.

DEPARTMENT OF EDUCATION (DEd)

Summary

The Department of Education (DEd) spent approximately $6 million on projects in metric education between 1976-79. After 1980 such discretionary funds were collapsed into block grants to states. The DEd has ceased to influence metric education in the nation's schools. The DEd has no formal metrication plans at this time. Metric education is left to the discretion of the state and local governments.

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF DEFENSE (DOD)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	☐

OTHER ____________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF EDUCATION (DEd)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	☐

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	■	☐

OTHER COMMENTS

DEPARTMENT OF ENERGY (DOE)

Summary

The Department of Energy (DOE) has adopted a wait and see attitude toward metric conversion. While a metric policy has been developed there has been little action at any level of the Department. There is some use of metric in technical documents and in procurement, especially in the nuclear area. All new nuclear warheads are designed in metric. There is little prospect of change until the Federal Government or industry takes a more aggressive approach to metric conversion.

FEDERAL COMMUNICATIONS COMMISSION (FCC)

Summary

The FCC is active in metric. As the agency responsible for regulating the nation's communications systems — television, radio, and others — they are involved in measuring signal dispersions as well as distances betwen antennae and height of antennae or towers. The FCC is currently working on changing its FM regulations to metric units. They plan to convert regulations governing television and AM radio to metric. When this is acomplished FCC will be 95% metric since these regulations are the backbone of FCC activity. Extensive involvement in international agreements using metric units is pushing FCC toward conversion.

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF ENERGY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	■	■	☐

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

AGENCY: FEDERAL COMMUNICATIONS COMMISSION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	■

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

GENERAL SERVICES ADMINISTRATION (GSA)

Summary

The General Services Administration (GSA) builds, buys, maintains, and operates much of the U.S. Government's property. The GSA has recently proposed a change in Federal procurement procedures to identify and remove, with the help of industry representatives, any barriers to buying metric products or services resulting from existing standards and specifications. At present, GSA buys very few metric products, less than 10% of the value of their total purchases. Very few specifications and standards are in metric. With the proposed changes, the process for purchasing metric products will be in place, thereby allowing purchases of cost competitive metric products.

DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

Summary

Metric activity in the Department of Health and Human Services (HHS) is concentrated in the Food and Drug Administration (FDA) within the Public Health Service (PHS). Internal directives and methodological regulations are largely in metric. Where FDA regulations deal with consumer products and labelling, conversion is less advanced. As the food industry converts to metric, the role of metric in FDA regulations will increase. Other sections of the Public Health Service such as The National Institutes of Health use metric in accordance with professional practice in medicine and medical research.

DIAGNOSIS OF METRIC SITUATION

AGENCY: GENERAL SERVICES ADMINISTRATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐ Standards ■ Procurement ■ Press Releases ☐ Regulations ☐

OTHER ____________________

FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

Many people in the federal government cite GSA and Defense as the two most active government agencies in terms of metric.

DIAGNOSIS OF METRIC SITUATION

AGENCY: **HEALTH AND HUMAN SERVICES**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐ Standards ☐ Procurement ☐ Press Releases ☐ Regulations ■

OTHER ______________________________

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FORMAL METRIC POLICY? None ■ Yes ☐

OTHER COMMENTS

Most activity in HHS is in the Food and Drug Administration which regulates 25% of the consumer's dollar.

HOUSING AND URBAN DEVELOPMENT (HUD)

Summary

There is very little metric activity in Housing and Urban Development. There is little prospect of increased metric activity in HUD given the slow pace of conversion in the construction industry.

DEPARTMENT OF THE INTERIOR (DOI)

Summary

Metric is not widely used in Department of the Interior activities which consist of managing the Nation's natural resources--water, lands, minerals, parks and wildlife. The Department does little direct procurement. The major exception is found in the Bureau of Reclamation which builds and maintains water systems in seventeen western states. The Bureau has performed some metric construction work; however, metric is used in only a small portion of the overall construction work of the agency. There is little momentum for conversion within the Department. The momentum in the National Park Service has declined because of adverse reactions to metric signs posted in national parks. The Bureau of Reclamation is likely to continue its low level of metric procurement.

DIAGNOSIS OF METRIC SITUATION

AGENCY: HOUSING AND URBAN DEVELOPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY
(IF ANY)

☐ Planning
☒ Standards
☐ Procurement
☐ Press Releases
☒ Regulations

OTHER ____

FORMAL METRIC POLICY? ☒ None ☐ Yes

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF THE INTERIOR

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	■	■

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

INTERNATIONAL TRADE COMMISSION (ITC)

Summary

The current level of metric activity at the International Trade Commission is minor. The proposed revision of the U.S. Tariff Schedule involves changing most of the measurements used in the classification to metric units. This is to facilitate trade among different nations. If the revisions are accepted, the Commission will operate largely in metric dimensions. The revisions of the tariff schedules are still under consideration and are not likely to be implemented within the next year. According to international agreement, the revised tariffs should be in force by January, 1987.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

Summary

In some areas of NASA metric use is extensive, especially where international production or use is involved or where there is a high degree of scientific activity. The status of metric has remained relatively stable over the past three years. For the most part, NASA has reached a plateau in the use of metric. Those systems that could be converted easily have been while others remain in customary. There is little momentum to increase the amount of metric activity in NASA.

DIAGNOSIS OF METRIC SITUATION

AGENCY: INTERNATIONAL TRADE COMMISSION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	■	☐

OTHER COMMENTS

Momentum is considered high because of the likely passage of the revised tariff schedules using metric measurments within the next five years.

DIAGNOSIS OF METRIC SITUATION

AGENCY: **NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	■	■	☐

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

STATE AND LOCAL GOVERNMENTS

Summary

Metric activity at the state and local level is low to non-existent. There has been little change in the status of activity since the demise of the USMB. The National Conference on State Metrication acts as a dissemination and response network for Federal initiatives on metric. The National Conference on Weights and Measures monitors the regulatory status of metric in the states and identifies obstacles to conversion. While activity may increase as a result of growing interest in promoting international trade, there is little prospect for extensive metric activity at the state level. The USMB "Summary Report" of July, 1982 provided a synopsis of metric status in each of the states. This chart is included following the diagnostic chart to provide a diagramatic overview of the states' conversion activities.

TENNESSEE VALLEY AUTHORITY

Summary

Metric activity is very low at the Tennessee Valley Authority (TVA). Multiple agency reorganizations and a wait and see policy have left the agency little further than it was 5 years ago. TVA procures many products. Where available, such as in the nuclear area, it buys in metric units. However, very little of its procurement is metric. There is little momentum for conversion within TVA.

DIAGNOSIS OF METRIC SITUATION

AGENCY: STATE AND LOCAL GOVERNMENTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
ESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
UTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	☐	■

OTHER Review of federal initiatives

Education

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

Several states have formal metric policies but primarily in specific areas. New York, for example, has policies in the area of education and weights and measures.

STATE METRIC STATUS : U.S. Metric Board Summary Report, July 1982

State	State Metric Policy		State Government Metric Activity		State Mechanisms for Coordination			Conversion Activity within State Government			Conversion Activity with the Private Sector			Public Education			
	1. Has policy. 2. Has no policy.		1. Executive activity. 2. Legislative activity.		1. Departmental designee responsible. 2. Committees with State Government only representation. 3. Committees with Public, Private, and Government representation.			1. Gasoline pumps. 2. International trade. 3. Highways.			1. Surveys of private-sector metrication. 2. State aid and private-sector employee training. 3. Data sources for private sector.			1. State mandate for metric activity. 2. Grant monies. 3. Metric workshops/training. 4. Teaching of metric.			
	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2	3	4
Alabama		X		X	X			X				X		X	X	X	X
Alaska					X			X									
Arizona		X		X	X			X		X				X	X	X	X
Arkansas	X				X			X	X						X	X	X
California	X			X	X		X	X	X	X	X	X	X	X	X	X	X
Colorado		X	X		X		X	X	X						X	X	X
Connecticut	X		X		X		X	X		X				X		X	X
Delaware		X		X	X			X					X	X	X	X	X
Florida	X		X	X	X		X	X	X	X	X			X	X	X	X
Georgia		X			X		X	X	X								
Hawaii	X		X	X	X		X	X			X			X	X	X	X
Idaho					X			X									
Illinois					X			X									
Indiana		X			X			X									
Iowa	X				X			X							X	X	X
Kansas		X			X			X	X	X			X		X	X	X
Kentucky		X			X			X									
Louisiana	X		X		X			X				X		X	X	X	X
Maine		X	X		X	X		X						X	X	X	X
Maryland	X		X	X	X			X	X	X				X	X		X
Massachusetts		X		X	X			X		X					X	X	X
Michigan	X				X			X					X	X	X	X	X
Minnesota	X			X	X			X						X	X	X	X
Mississippi		X		X	X			X	X		X			X	X	X	X
Missouri	X				X	X		X				X	X		X	X	X
Montana	X		X	X	X	X		X						X	X	X	X
Nebraska		X		X	X			X	X		X	X		X	X	X	X
Nevada	X		X	X	X		X	X								X	X
New Hampshire				X				X									
New Jersey					X			X								X	X
New Mexico		X	X	X	X			X						X		X	X
New York	X		X	X	X	X		X							X	X	X
North Carolina		X	X		X	X		X						X		X	X
North Dakota	X			X	X			X							X	X	X
Ohio		X		X	X			X		X				X	X	X	X
Oklahoma					X			X									
Oregon		X	X		X	X		X		X	X	X		X	X	X	X
Pennsylvania		X		X	X			X							X.		
Rhode Island		X			X			X						X		X	X
South Carolina	X			X	X		X	X				X		X	X	X	
South Dakota		X		X	X			X		X					X	X	X
Tennessee		X	X		X		X	X							X	X	X
Texas	X			X	X		X	X		X		X		X	X	X	X
Utah					X			X									
Vermont	X				X		X	X		X				X	X	X	X
Virginia		X		X	X			X				X		X	X	X	X
Washington		X	X		X	X		X		X	X	X			X	X	X
West Virginia		X		X	X			X				X		X	X	X	X
Wisconsin					X			X									
Wyoming					X			X									

DIAGNOSIS OF METRIC SITUATION

AGENCY: TENNESSEE VALLEY AUTHORITY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	■	■	☐

OTHER ____________________

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

DEPARTMENT OF TRANSPORTATION (DOT)

Summary

Very little metric activity is reported in the Department of Transportation. In the late 1970's, DOT made a concerted effort, together with a number of States, to convert road distance and speed signs as had been done in Canada. Given the intense adverse public comments that resulted, Congress passed a law which prohibited the use of metric-only signs and stated that customary units must be prominent on federally funded signs. Since that time, very little has been done although State and Federal agencies appear to be ready to convert whenever requested. Some activity is reported in aeronautics and marine sections. DOT is very active with the ANMC committee on aeronautics and aviation. The FAA has developed plans for converting to metric when and if that industry decides to convert. The St. Lawrence Seaway administrators are apparently completely converted due in large part to the necessity of coordinating their activities with Canada's. DOT resisted international efforts to require the metrication of shipping containers due to the large number of customary-sized containers still in use. Metric tariffs are now in place and available for those who wish to use them.

VETERANS ADMINISTRATION (VA)

Summary

The Veterans Administration has converted to metric on an as-needed basis. The VA builds and maintains hospitals and purchases medical and other supplies for those hospitals. The VA also supports research in medicine and other related areas. When it authorizes construction it rarely uses metric. The VA is following the proposed Federal guidelines for identifying and removing barriers to metric procurement. However, the VA will not lead in the buying or developing of metric products. It will follow industry's lead. Metric conversion in the VA will remain at its present level unless metric becomes more prevalent in the market-place, especially in the construction industry.

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF TRANSPORTATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	■	☐

OTHER ____________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

AGENCY: VETERANS ADMINISTRATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☒	☒	☒	☐

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	☒

OTHER COMMENTS

The VA will follow industry's lead on metric conversion.

CHAPTER IV

CROSS-CUTTING ISSUES

Introduction

The assessment of the status of metric conversion in the United States in this report is organized around the activities of specific industries and individual government agencies. There is, however, more to the status of metric in the U.S. than the sum of these activities. Three factors are central throughout the discussions of industry and government activity. These three cross-cutting issues are:

* Foreign trade: exports and imports are central to understanding the role of metric in the U.S. economy.

* Standards: Much of industrial production and procurement uses standards. Many standards are used by several industries and agencies. The role of metric in standards development is therefore important to understanding the importance of metric in the U.S. economy.

* Type of metric activity: The discussions of industry and agency activity cover two types of action — Planning and other preparatory tasks and the actual conversion of products and services to metric.

This Chapter draws together observations from this assessment and from previous research to discuss the influence of these factors on U.S. conversion to metric.

Foreign Trade

Exports and imports of products as well as production facilities drive the growing involvement of the U.S. in metric conversion. As one of the few major countries not completely metric, U.S. companies encounter metric demands, requests, and specifications primarily in response to foreign markets or in serving the needs of companies producing for foreign markets. With the growing integration of the

U.S. economy with the global economy, the importance of metric for U.S. companies will increase. This and the following points are based on this assessment and on recent research by J.F. Coates, Inc. entitled, "The Role of Metric in U.S. Exports".

- The majority of U.S. trade is measurement sensitive. The proportion of measurement sensitive U.S. trade is particularly high with industrialized nations such as EEC countries, Canada, and Japan.
- Between 70 and 78 percent of U.S. exports to Canada in 1982 were measurement sensitive. Over half of Canada's exports to the U.S. in 1982 were machinery and manufactured goods, most of which are measurement sensitive. Thus measurement sensitive goods play a significant role in U.S.-Canadian trade.
- Metric affects all aspects of foreign trade — from assessing foreign market opportunities, to producing products for export, to the documentation for export, to servicing products in foreign markets. Metric is particularly important in the product design and servicing aspects of the export process.
- Many U.S. firms produce metric products for foreign markets in foreign subsidiaries or through licensing of franchising arrangements with foreign manufacturers. These procedures effectively export U.S. jobs and undercut the ability of U.S. small businesses to compete for contracts to supply products or services to these large companies.
- The U.S. government has taken a reactive posture toward metric issues related to export. They hear few concerns and assume that industry is handling any problems on its own. Industry has indicated little interest in the importance of metric for the competitiveness of U.S. products in foreign markets.
- Many U.S. companies do not export, the large domestic market absorbs their interest. When the domestic market declines, some of these companies turn to foreign markets. For the most part they attempt to sell products produced for U.S. markets in customary units to foreign markets. This practice is most common among medium to small manufacturers.
- Exporting is largely the province of large companies in the U.S. Many of these large companies are multinational which use foreign facilities to produce for foreign markets. In a number of cases, most notably the automobile makers, the desire for corporate integration has led to worldwide corporate standardization in metric units. Where there is

less of a drive toward such integration, metric products are often produced in foreign metric facilities.

- * Where the U.S. has dominated design, standards, and production customary units are prevalent. This is especially true of the aerospace industry. However, with growing foreign competition in all types of technologies, the dominance of U.S. standards and practices is declining. The decline of U.S. dominance will be associated with increased foreign demand for metric products in future.
- * It is expected that the U.S. will extent its foreign trade links substantially. The developing nations are increasingly important sources of U.S. trade growth. To be competitive in these markets, U.S. manufacturers will most likely increase their use of metric designs.

The overwhelming trend is that metric will be increasingly important to global marketing. This assumes that the U.S. continues to be an important, if not expanding, actor in the global market. In many cases metric will be intrinsically important to meeting the needs of the global market. In other cases, metric will be a hygenic factor, that is, a factor whose presence will create no advantage but whose absence could be a significant disadvantage. U.S. companies, large and small, will have to be familiar with metric and able to communicate and work in metric in order to succeed in the future global market. In some cases, this will require U.S. producers to change their products to metric dimensions.

Standards

Standards are key to much industrial activity. As a document, unit of measurement, or object approved by a recognized authority, a standard provides a stable basis for present and future technological and economic development. Based on science, technique, and experience, standards can range from specified sizes for washers to standards for radiation emission from X-ray machines.

Many standards involve measurement and the use of standards based on customary measurements can inhibit the introduction of metric. Similarly, the availability of metric standards can promote the use of metric measurements. Converting standards to metric often involves more than just providing metric equivalents to customary measurements based on existing standards. In many cases, such equivalents can add unwarranted levels of precision. On the other hand, if the equivalents are rounded off unnecessary imprecision arises. In many cases the most appropriate course is to develop wholly different standards based on rational or convenient metric units. This is often the best way of dealing with the complex interrelationships and tolerances involved in standards. The following observations on the role of metric in standards development in the U.S. are taken from a U.S. Metric Board study titled, "Status and Outlook of Metric Conversion of Standards: The Views of Nine Selected Major Standards Development Bodies" (May 1982). These findings are confirmed by the results of this assessment.

(1) Metric conversion is not recognized as a major issue or problem for standards developing organizations.

(2) Several barriers to the development and use of metric standards exist and have been cited by standards developers. At present, the greatest barrier is simply the lack of demand for such standards. A significant barrier to metric conversion is competitively priced items or systems, whether in government or industry. Early costs of metric versions of products may be significantly higher than for inch-pound versions. An additional barrier is the dual maintenance (service tools, parts, and training of personnel) costs resulting from the initial conversion which would be expected to last for some period after conversion. Some concerns related to safety from the development and use of metric standards were cited. Present use of inch-pound standards by regulatory agencies has not served as a significant barrier to the development and use of "metric" versions of standards.

(3) Standards development organizations react to market demand for their standards. Although the Department of Defense has announced a target date of 1990 for having necessary military metric standards available, there is at present no clearly articulated demand for metric standards from industry, government agencies, or other users of standards.

(4) Standards developing organizations acknowledge the need for raising awareness among both the standards users and standards writing organizations of the advantage of continuous attention to consideration of hard metric in new product design, and especially in new technology areas.

(5) Standards work normally follows technology and reflects consensus on design and manufacturing processes. The language of the Metric Conversion Act can be interpreted to recommend anticipatory conversion

of standards to support planned future conversion. Since metric standards represent a dimensional or measurement unit change only, such advanced conversion of standards is probably technically feasible in most industries, but some experts feel strongly that metric development and conversion of standards which are not based on experience of prior use, testing and evaluation are highly questionable. In addition, since metric conversion appears to be proceeding incrementally and not by major sector coordinated, industry-wide timetables it is unlikely that industry will support anticipatory development of metric standards. A national commitment to convert to the metric system, of course, would lead to industry support for anticipatory development of metric standards.

(6) For Federal agencies to have a real impact on the pace of metric standards development, agencies would have to specify metric in procurement, which would lead to significant extra cost.

(7) Some organizations are concerned about the threat of foreign origin standards displacing U.S. non-metric standards, but most standards writing organizations do not view this as a major problem. The standards bodies cited no cases where"foreign origin" international standards have replaced U.S. originated de facto or recognized international standards because these U.S. standards are not metric. Other factors, such as different power system voltage and frequency requirements, are far more important considerations for international acceptance of U.S. standards than whether or not a standard is in metric units.

(8) All of the interviewed standards organizations indicated that as yet the fact that U.S. standards are not metric has not been a substantial deterrent to international acceptance of U.S. inch-pound standards.

(9) Standards developers generally felt that they have the infrastructure in place to respond to a significant increase in demand for the development of metric standards, should such a demand develop.

(10) Because of the wide variety of industry, economic, and technological factors, a single strategy for encouragement of anticipatory conversion of standards is difficult to develop. Conversion by U.S. industry to metric is proceeding relatively slowly. While some inconvenience may result from lack of convenient and timely availability of new "hard metric" U.S. standards, other economic and social factors are far more significant considerations in the decision to convert manufacturing processes or products to metric.

International standardization and associated pressure for international standards does not receive much weight in the previous points. However, ongoing research by J.F. Coates, Inc. on the role of metric in international trade indicates that international standards may become increasingly important to the operation of U.S. firms in foreign markets. What is not clear is how U.S. business will respond to these standards in terms of advocacy. While the U.S. interpretation of the GATT Agreement on Technical Barriers to Trade sees the choice of measurement systems as a national prerogative, U.S. firms operating in international markets must be ready to adapt to international metric standards and their use. There is a general sense that the role of international standards in foreign trade is increasing. Given this general background, the Coates study made the following points about metric, international standards, and U.S. trade:

* While the U.S. leads other nations in terms of the de facto acceptance of its standards as international standards, that position is changing. Other nations, such as Japan, France, and Germany, are aggressively marketing their standards in bilateral and multilateral negotiations. As the products and technologies of these countries become more competitive with those of the U.S., these efforts and their success will increase.

* A decrease in the acceptance of U.S. standards as de facto worldwide standards will mean an increase in the use of metric standards in foreign trade.

* The effects of increasing the use of metric standards is unclear. Many nations do not enforce standards policies strictly, and many readily grant exceptions or deviations. Also, foreign companies do not necessarily use the standards put forth or recognized by the government. Thus, the effects of growing numbers of international and internationally accepted foreign nations' standards will differ depending on individual products in specific countries.

* As metric becomes more common in international commerce in terms of acceptance of other nations' standards or ISO and IEC standards, the tolerance for deviation, such as products designed to customary measurements, may decrease.

* On the other hand, a move to greater reliance on performance standards may decrease the importance of whether a product is in metric or customary — from a standards point of view. Some types of products, such as building supplies, will always rely on design standards.

* Where the U.S. continues to lead technology and product development, the move to growing acceptance of international or foreign standards is slower. The computer field is one such example.

- Standards issues, especially measurement issues, most severely affect companies inexperience in exporting, since they are not familiar with the complexities of the standards situation. Small companies are affected more than large ones since small companies do not have the available staff to deal with standards issues.

The Types of Metric Activity

Assessing the status of metric in the United States means looking at the many facets of metric conversion. These range from people talking about converting, or planning to convert, to the actual change of a product to rational metric sizes. In between are the development of metric equivalents on existing cutomary standards, dual labelling, and the development of hybrid metric products — products using components of both metric and customary design.

The general conclusion among attentive observers is that there was substantial metric activity in the middle 1970's preceding and following the passage of the 1975 Act. They also see a decline in the level of activity since the middle 1970's. The assessment reported here, however, reveals a substantial amount of metric activity in the U.S. economy. How does one reconcile these conflicting views?

The key is the type of activity. In the 1970's most of the activity was planning related or paper-based activity. This included talking about converting, looking at standards, laws, regulations, and other documents to identify barriers or problems to conversion. While this planning activity continues today, the emphasis in metric activity has shifted to the less visible conversion of products or of product labelling. Ironically, much of the "actual conversion" now occurring is weakly related, if at all, to the planning activity of the middle 1970's. In short, in the U.S. metric has moved from being an issue of policy and public debate which would be reflected in the press to a matter of operational activity in the factory or on the shop floor. These operational changes are less visible but more lasting and substantial than the "paper-based" activities preparatory to metric conversion.

CHAPTER V

U.S. CONSTRAINTS ON CANADIAN SECTOR CONVERSION

This Chapter addresses specific areas where it is felt there are situations in the U.S. which are impeding conversion to metric in Canada. Some of these constraints are specific institutional barriers such as FAA air and ground operations nomenclature and ANSI/ASTM standards for wire gauge sizes. Others such as building design and engineering practices are based on long-standing tradition, overlap many industries and products, and are dependent on customer demand. It is a slow process to change institutional barriers, but it can be done by agreement among industries, government agencies and international organizations. Changing traditional practices can be an even harder and longer process.

The seventeen constraint areas identified by Metric Commission Canada are as follows. The Canadian Sector Committee number for each area is included in brackets.

1. Air Transport (1.01)
2. Rail Transport (1.02)
3. Railroad Rolling Stock (2.06)
4. Heating, Ventilating, Air Conditioning and Food Service equipment (2.08)
5. Plumbing and Hydronic Heating (2.09)
6. Builders and Home Hardware (2.25)
7. Machinery and Fluid Power (2.32)
8. Recreational, Outdoor Power and Specialized Equipment (2.34)
9. Electrical Manufacturers (3.01)
10. Aircraft and Aircraft Parts Manufacturers (3.03)
11. Implementation of SI Radiological Units (3.11)
12. Structural and Architectural Metals (5.03)
13. Wood (8.20)
14. Paper and Allied Industries (8.45)
15. Amusement and Recreation - Sports (9.21)
16. Horticulture (61.05)
17. Fishing and Fish Products (61.06)

Air Transport (1.01)

ICAO agreement for air and ground operations. International agreements are currently in imperial units. Draft proposals for amendments are under consideration by ICAO. US/DOT and FAA are expected to make key input.

The FAA coordinates metric activity in the aviation field. Their policy is not to promote or discourage metric conversion, but only to respond to what's happening. If metric conversion were requested by industry members, they would respond. No such action has been requested.

The International Civilian Aviation Organization published Annex 5, 4th edition in July of 1979 which became effective as of November 26, 1981 and which converted all aeronautical terms to metric. The U.S. approved the Annex but asked for alternate terms in the following areas:

Altitude -	feet
Distance -	miles
Height elevation -	feet
Altimeter -	inches of mercury
Airspeed -	knots
Groundspeed -	knots
Vertical speed -	feet per minute
Windspeed -	knots
Temperature -	Fahrenheit in surface air temperature and dewpoint temperature

These are the terms for which the U.S. asked and received exceptions. There are no plans to convert these terms at this time.

Rail Transport/Railroad Rolling Stock (1.02 and 2.06)

Operating rules and standards of the Association of American Railroads (AAR) are all in imperial units. This includes the Canadian Railroads. Equipment and Rolling stock design and engineering standards of AAR which include Canadian Railroads are all in imperial units. Minor amendments to standards do permit dual unit stenciling of car capacity.

The operating rules and standards of the AAR are still in imperial units. Rolling stock is designed and manufactured in imperial units. The standards for equipment and rolling stock do allow for dual unit labelling of cars, but this is requested only by the Canadians. Tunnel clearances are marked in customary and metric units, but there is no other use of metric in the railroad industry.

The railroads have been particularly hard hit by the recession in 1981 and '82. Industries of key importance such as autos and building materials have been sluggish. The partial deregulation of the railroads by the Staggers Act of 1980 has allowed them to adjust rates more quickly in response to the economic scene, or they would have been even more severely affected.

Export of cars and equipment is not a major concern to the industry. Continued low levels of demand are expected through 1983. Because of this and their many other current problems in regard to survival/growth, the railroad industry is not interested in any further change toward metric at this time. The pace of technological change is expected to be slow and it is felt there are no benefits to the industry in converting to metric.

Heating Ventilating, Air Conditioning and Food Service equipment/Plumbing and Hydronic Heating (2.08 and 2.09)
U.S. design and engineering practices in the field of industrial Heating, Ventilating, Air Conditioning and US. National Standards (ANSI, ASTM, ASME).

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) has produced a metric version of the industry handbook. The Air Conditioning and Refrigeration Institute write the standards for that industry in dual units. The guides for these standards are the ASHRAE standards which are based on ASTM document E380 (in SI terms).

There is no metric production in the U.S. Design is in inch/pound units. Conversion tables may be appended to standards and exporters may publish conversions in their literature. Since U.S. made equipment has developed a reputation for dependability and technical leadership and since the manufacturers are reluctant to change, there will be no rapid movement toward conversion in this industry. Although opportunities for trade would be enhanced by conversion, the industry contacts did express concern about increased foreign competition resulting from a conversion. The Japanese, aided by their government are making inroads in U.S. markets with improved products and complete parts and servicing facilities.

An upturn in construction, along with the threat of foreign competition could cause a change in attitude, but under current conditions, industry contacts predict no conversion to metric in the foreseeable future.

Builders and Home Hardware (2.25)

Continent-wide product standards and design practices of U.S. parent organizations.

The Door and Hardware Institute has been actively monitoring the ANMC and other organizations to keep abreast of metric activity. They provide education to members and occasionally publish a metric-related article in newsletters and journals. They do not foresee any metric conversion movement. There is no metric activity within the industry and there has never been a metric plan. Manufacturers of building equipment may dual label for export, but all domestic products are in customary only.

Machinery and Fluid Power (2.32)

U.S. market purchasing practices and the design practices of U.S. parent organizations.

The National Fluid Power Association engages in limited metric activity. Drawings are soft converted with some hard metric if a customer requires it. The policy is to prefer customary units. One large utility purchased metric hydro-turbines several years ago; however, they do not foresee any further purchases because of a downturn in demand for facility building. The Hydraulic Institute looked at metric three or four years ago but decided not to convert their standards. One major manufacturer of industrial pumps has not converted because of lack of standards and market demand. Upon request, jobs are quoted in metric, and metric drawings are furnished by this manufacturer.

The machine tool industry is gradually converting to metric. At present, about 10% of machine tools being sold are capable of producing in metric or customary units. Very few machine tools are designed in metric units. Major customers are the automotive and other transport equipment industries as well as companies producing products for the military. Multinational machine tool builders are inclined toward metric in order to rationalize production across national boundaries and to maintain foreign markets. However, the long lifespan of machine tools and the fact that many U.S. customers have not converted, inhibit conversion to metric.

Recreational, Outdoor Power and Specialized Equipment (2.34)

Continent-wide product standards and the design practices of U.S. parent organizations.

According to the Sporting Goods Manufacturers Association, there are no metric standards in the industry, nor is there any metric production. This is also true of U.S. manufacturered bicycles and motorcycles; however, a large percentage of sales in these two vehicles are metric imports. There are imported metric parts (derailleurs, nuts and bolts) used on U.S. made bicycles. Snowmobiles are designed according to standards which are dual-labeled. Twenty to thirty percent of these are exported to Canada.

Recreational vehicles use some import products (refrigerators from Sweden and some European and Japanese chassis), but are mostly U.S. parts which are in customary units. However, since cars and trucks are rapidly becoming metric, it is inevitable that recreation vehicles will eventually convert.

Skis are hard metric, since a large percentage of them are imported.

Metric activity is high in coin-operated amusement devices. Metric electronic video games originated in Japan and are being produced in metric in the U.S. Since the manufacturers of these games also produce music, pool and other coin-operated games, they are increasingly producing metric parts for these machines in order to simplify their operations.

Electrical Manufacturers (3.01)

American Wire Gauge sizes established in ANSI/ASTM standards for electrical cables and conduits and industry design practices for industrial and home appliances are the references for the Canadian industry.

The National Electrical Manufacturers Association (NEMA) has a policy to include dual dimensions in all of their standards as they are revised. They publish about 200 standards which are reviewed at least every five years. At that point they are reaffirmed or revised. NEMA is in the process of revising all of their standards to include metric dimensions and have completed this task on 60% of them.

The National Electric Code which is required in most states has been soft converted since 1981. Electrical units have always been referred to in metric terms, but very little electrical equipment is actually produced in metric dimensions. This industry follows closely the requirements in the construction industry, which shows little sign of converting, so there is little push towards metric conversion in electrical products. The many, varied and complex codes throughout the U.S. also inhibit conversion.

Radio, TV and tape players are heavily metric and are expected to continue in that direction as new products are developed.

The home appliance industry produces no metric products in the U.S. There are few exports in this industry. Standards do list both dimensions, but there is little interest in conversion to metric by U.S. manufacturers.

Aircraft & Aircraft Parts Manufacturers (3.03)
U.S. standards (such as DoD military standards and specifications, National Aerospace Standards, and Society of Automotive Engineers Aerospace Standards and Aerospace Materiels Standards), design practices and regulations are the references for the Canadian industry.

There is little activity among U.S. producers of air transport equipment. The U.S. has dominated the world aerospace industry and as a result its standards and practices have become the world wide standard. The major force for metric conversion of aircraft will come from the Department of Defense or from the development of superior foreign designs which are in metric dimensions. DOD policy indicates the need for interchangeability and interoperability of parts in NATO projects, but still prefers to follow, rather than lead, U.S. industry in metric conversion.

The U.S. aircraft industry has produced about 140 of its own metric standards for aerospace but use is sporadic because of the low level of metric production in the U.S.

The intent of U.S. manufacturers is to continue to design and produce aircraft using customary measurements, but this could be modified by the needs of DOD.

Implementation of SI Radiological Units (3.11)
Member countries of the International Atomic Energy Agency (IAEA), of which the U.S. is one, have yet to agree on a common date for the adoption of recommended SI units. The U.S. Nuclear Regulatory Commission has yet to adopt the SI units.

A spokesman for the Nuclear Regulatory Commission says that they have not convered to SI units although they do use dual dimensions in their regulatory guides and technical reports. The official policy in this agency, as in other government agencies, is to neither promote nor discourage the use of metric, but rather to follow the lead of industry. They would have no problem with licensing a metric designed nuclear power facility but have not received any requests to do so and do not foresee any metric activity in that industry.

Structural & Architectural Metals (5.03)
The ASME Boiler and Pressure Vessel Code which governs the design and inspection of boilers on the North American continent is now available in SI. Some feel this will spur industry to conversion to metric. However, there were no new power plants built nor industrial boilers or turbine generators ordered in 1982 (McGraw-Hill's Electrical Week, 1982-12-20). High interest rates, lagging response to rate increase requests and low load growth indicate that the power equipment industries will operate at low levels for several more years.

Wood (8.20)
U.S. purchasing and building practices and material testing standards specify non-metric dimensions for lumber and panel products.

Construction is the most important market for the wood products industries. Since construction still relies on cutomary units and shows no indication of converting to metric, the wood industry is not likely to convert in the forseeable future. In addition, a large part of construction business is in repair and remodeling which would require carrying dual inventories for many years if metric conversion took place in the wood industry.

Wood exports were 27% of total product shipments in 1982, a proportion that has stayed level over recent years. Improvement in world economies and export market expansion would influence the wood industry to convert to metric.

Resolving problems stemming from differences in sizes of lumber and plywood would increase exports to Japan and other Asian countries. The Metric Reporter (1983-09) notes that many mills are producing metric products for export to offset a tight domestic market.

Paper and Allied Industries (8.45)

Printing and Publishing. The conversion of fine paper products in North America is basically a soft conversion (i.e. one of language) and change of nomeclature "grammage". To date agreement with the U.S. has been reached on metric sizes for correspondence paper only and the implementation date of metric units for all fine paper products in the U.S. remains outstanding.

The U.S. paper industry has reached an agreement with Canada on acceptable metric sizes for correspondence paper. This standard is being processed for approval by the ISO. Even if it is approved, however, there are no plans to implement the use of metric sized paper in the U.S. Metric conversion in the paper industry at this time is confined to dual-labelling in the testing methods standards, in the Government Printing Office specifications, and in reports from the paper industry's technical association. The semi-official policy in the industry is to be reactive to metric conversion. No industry members contacted expect hard conversion to occur in the U.S.

Amusement and Recreation, Sports (9.21)

International rule books which control some sports, such as soccer, tennis, skiing and track and field are not entirely SI.

The U.S. Olympic Committee measures events entirely in metric. In the U.S., the National Collegiate Athletic Association (NCAA) uses metric to some degree in track and field and swim events. They required its use until 1983. Now it is used where athletes may be involved in international events but they are no longer attempting to use with metric in all events. Other U.S. athletic associations report the same attitude. The Metric Reporter has documented some confusion occurring because of this. Some records were not acknowleedged in recent events because metric was not used. They also report that the International 500 Snowmobile Classic was changed to 500 kilometers this year (as opposed to 500 miles last year). Soccer and tennis rule books still specify feet/inches for all events.

Horticulture (61.05)

Canadian industry in the field of fruits and vegetables is unable to proceed unilaterally with its conversion. If the Canadian industry were to adopt hard metric sizes for Canada, it would still need to have customary sizes for the U.S. market. This is seen as an unnecessary added cost. Most U.S. exporters do not consider the Canadian market substantial enough to justify a change to SI. New North American Standards for pallets and containers are being developed.

In the early 1970's, international standardization of pallets, and carton and container sizes used in transporting food was pushed by manufacturers and trade associations. The project, M.U.M. (Modularization,Utilization and Metrication), lost momentum in the late 1970's and was replaced by a move to standardize sizes according to the closest customary equivalent. The common international pallet size, 1000 mm by 1200 mm. then becomes 40 inches by 48 inches.

A spokesman from USDA who is involved in recent efforts on the M.U.M. project says that a meeting was held a few weeks ago by the United Fresh Fruit and Vegetables Association (UFFVA) during which they agreed to expand the number of acceptable sizes of containers from five to fourteen. The five sizes did not hold the same count of citrus items, e.g., with the new system a container may hold 53 items rather than 48. The fourteen sizes decided upon will still fit the modular pallet. They will focus on grapes and tomatoes when beginning the implementation of this project and will not mandate, but will recommend to industry members that it be followed in the interest of greater economies through standardization.

Fishing and Fish Products (61.06)
Canadian exports have to accommodate the U.S. market. The U.S. primary market dictates imperial package sizes.

There are no institutional constraints in the U.S. on package sizes of fish products. In fact, a lot of seafood is imported from Canada in bulk and packaged by U.S. processors. The only institutional constraint is the Fair Packaging and Labelling Act which requires that English units be displayed. Metric units may be added and are, in fact used frequently on fish packaging.

Fish buyers expressed no concern about the size of a package, only its quality and appearance. However, the traditional package size (16 oz.) for frozen fish does seem to be prevalent.

USDA is in the process of doing studies on the economics of standardization of frozen food packaging in relation to the M.U.M. project. They will probably start with fruits and vegetables and include frozen fish later. When these studies are completed, they will be presented to industry members as recommendations; nothing will be mandated.

Summary of Constraints

In summary, the investigation of the seventeen areas in U.S. industry where constraints to Canadian metric conversion were identified revealed progress in two areas, structural and architectural metals and horticulture.

In the other areas investigated, the constraints remain in place with no impending prospects for change expressed by the industry members contacted. These areas include: railroad operating rules and rolling stock design standards; design and engineering practices in heating, ventilation and air conditioning equipment, building hardware, machinery/fluid power, recreational equipment, aircraft, wood products, fine paper products and fish products; measurement of radiological units; and rule books used for sports such as tennis, soccer, track, and field events.

A complete assessment of the impacts of these constraints on Canadian sector conversion efforts would require discussions with industry representatives of the sectors concerned.

The lumber industry, for example, is very dependent on the U.S. for both imports and exports. The effect on Canadian mills appears to be significant as they have to produce lumber and panel products in customary units for export to the U.S. and in SI. units for other export markets. The precise extent of the effect that this has on the lumber industry would have to be obtained from the industry itself. In addition, one would have to estimate the impact on related industries such as construction to obtain a complete perspective.

A proper assessment of the impacts is, therefore, outside the scope of this report. It is recommended that the MCC develop a detailed dossier, for each sector affected, which identifies the specific impediments to conversion caused by U.S. sectors maintaining the customary units of measurement. These can then be presented to the U.S. Department of Commerce with the request that negotiations be initiated to alleviate the constraints to Canadian conversion.

CHAPTER VI

GENERAL FINDINGS

America is converting to metric. In the absence of a government mandate to convert, the central driver to metric conversion is the increasing integration of the U.S. industry into the global "economy".

From this assessment of the status of metric activity in the United States the following general conclusions were found:

* Wherever there is significant movement towards metric conversion, it is tied to international trade. Those companies and people most closely tied to international markets are the most likely to work and communicate in metric units.

* There is no government policy promoting the use of metric in the economy. The action in the economy is entirely the product of private sector decisions.

* The leaders in metric conversion in U.S. industry are large multinational firms with close ties to international markets and strong interests in standardizing production on a global scale. Among these multinationals, conversion to metric is largely with the original equipment manufacturers (OEMs), manufacturers of heavy machinery, agricultural equipment, and construction equipment. The automobile industry is setting a major precedence towards conversion to metric.

* Among the OEMs, the principal reasons for converting to metric are the needs for interchangeability, uniformity of product, economies of scale, and other factors associated with serving a global market.

* The large organizations noted above are pulling their suppliers into metric. In general, the suppliers are smaller firms using an increasing amount of dual capability machinery. Consequently, the conversion of the suppliers to metric is increasingly easy, commonplace, and relatively uneventful for them.

* By no means is the feeling that metric is inevitable, universal. In this survey approximately a third of the respondents felt that metric was not inevitable, or that it would never be realized.

* Metric activity has changed in the U.S. over the past ten years. Immediately before and after the passage of the 1975 Act, most of the activity focused on planning. Current activity focuses on the less visible, but more lasting, conversion of products such as cars, steel, or soft drink bottles.

* We have found no evidence that metric conversion proceeded as a result of overall coordinated industry or sector planning. Conversion results largely from incremental, individual corporate decisions.

* Economic advantages are more significant to the conversion process than the availability of hard metric U.S. standards.

* In the U.S. there is a widespread lack of differentiation with regard to the metric system of measurement. Most people in the U.S. use the terms "customary", "English" or "metric" and do not understand the term SI.

* As a general point of ambience, most industries which are not yet using the metric system, see the force to metrication coming from somewhere outside their own industry. The existence of the U.S. Metric Board was seen as a strong positive indicator towards metric, its own statutory function of non-advocacy being somewhat beside the point. The demise of the U.S. Metric Board seems to have added a degree of confusion to the matter and slowed or stopped planning in some sectors.

* The Federal Government policy supports voluntary conversion initiated by the private sector. The active agencies such as Defense and the General Services Administration as well as the less active agencies such as Agriculture and Transportation will follow the lead of the industries they serve or regulate. The primary thrust of the government's limited metric activity at present is to identify and remove impediments to the use of metric measurements by the private sector.

* The state governments in the United States are slightly more conservative than the Federal Government in their approach to metric. Some states do have regulations which might present barriers to metric conversion. There is no indication, however, that they would present substantial barriers to metric conversion should it become a nationally legislated or regulatory program. The continued existence of these regulations merely reflects the fact that changing them is not a high order priority.

* With regard to education, science and technology education is strongly metric. Metric is also fairly well established in the math curriculum of primary and secondary schools. The rest of the educational sector such as vocational education, remedial education, and adult education has

moved away from metric, largely because of the abandonment in the late seventies of Federal funding for metric education programs.

- There has been little adverse reaction to metric coversion. However, most conversion has occurred in the industrial area. Retail firms see little customer interest in metric and anticipate significant negative public reaction should conversion be attempted on retail goods.

There are a number of industrial areas in transition:

- The lumber industry, for example, will surely move in the direction of metric, although the movement is not strong and clear at this stage.
- The production of metal products is moving in the direction of metric. This is facilitated, as noted above, by their dual capabilities and by the OEM influences.
- Regarding the high tech industries, the front end of the process — science and engineering — is increasingly committed to the usage of metric units at the development and production stages lag behind. There is a widespread feeling, however, that the conversion will spread from the design stage to the production stage.
- Conversion to metric in the electronics industry is somewhat split. A definite move towards conversion to metric is occurring in the field of business machines.
- Transportation and communication and the electrical industry are converting in a spotty pattern. Where conversion is occurring, it is largely driven by international marketing forces.
- Some major sectors such as the housing industry are unlikely to convert to metric in the near future. One barrier is the tremendous amounts of state and local codes. Conversion to metric is only likely to occur in the event of substantial reforms or other occurances which cannot be anticipated.
- The occupational groups serving industry, such as die-casting, patternmakers, and toolmakers, are excellent indicators of conversion because they are in the middle of any transitions. They currently reflect an uneven pattern of conversion with automobiles and heavy machinery leading, and construction and consumer appliances lagging.
- Most of the special constraints identified by Canadian sector committees are real and not likely to change in the foreseeable future.

In addition to these general findings, the assessment covered other more specific indicators of metric activity in the United States:

* Market Penetration: sale of metric products in the U.S. is low to moderate depending on the industry. With the exception of processed foods, most of this market penetration involves the sale of hard metric products. In some industries such as autos there is high market penetration; in others such as construction there is no market penetration of metric designs.

* Standards/Codes Converted: the status of standards conversion also depends largely on the industry. Most industries at all involved in metric have soft converted existing U.S. standards to include metric equivalents. The recent GSA policy on federal standards reflects the increasing use of metric in standards. However, the number of hard metric U.S. standards remains quite small.

* Legislation Enacted: there has been no substantial legislative initiative regarding metric conversion at the national level since the 1975 Metric Conversion Act. There is no reason to believe there will be any legislative activity in the next several years. At the state level most activity is in terms of regulations and codes. There has not been any substantial metric activity at the state level in the past five years.

* Policies of Resolutions Adopted: at the governmental level the Federal Government as a whole and many of its larger departments have adopted metric policies. These policies advocate federal activity in concert with the actions of the private sector. The Federal Government will not lead industry in converting to metric. At the industry level there are numerous planning activities going on within ANMC and in the larger industry associations. However, this assessment shows that these plans are largely dissociated from actual conversion.

* Support Provided to Sectors by Government or Other Sources: government's role in metric has changed its focus since the demise of the U.S. Metric Board and the establishment of the Office of Metric Programs in the Department of Commerce. The OMP no longer engages in research and public information and education but rather stresses the need for metric conversion in regard to its impact on international competitiveness. Government officials continue to participate in standards and metric planning activities — most notably in connection with ANMC. The major support for conversion planning in the U.S. comes from the private sector in terms of its contribution to ANMC. There is a general feeling that these contributions have declined over the past several years.

- Metric Practice Guides Approved: the ANMC maintains a bibliography of metric practice guides developed by U.S. industry. There are over 60 such guides at present. However, none of the respondents to the survey upon which this assessment is based noted practice guides as an important factor in the conversion efforts of industry.

CHAPTER VII

FUTURE MONITORING - ADVICE AND RECOMMENDATIONS

General Advice

Taking the present report as baseline, the three best areas to probe in order to obtain an up-to-date but general report on the status of conversion, are Federal agencies, journal editors and association officials. Further investigations with representatives of individual companies is much more labor intensive and expensive. For more detailed information in specific product areas, however, sources such as technical committees of standards development organizations (public and private) and manufacturing and industrial engineers would have to be tapped. Also, with regard to the private sector, the American National Metric Council (ANMC) is a good source of continuing information. Any follow-on studies should complement the information available through ANMC to get additional detail and to check their conclusions.

Since the Federal Government structure for probing metric is attractive, comprehensive, and already in place, some important guidelines should be recognized in taking advantage of that important asset.

Guidelines on Probing Federal Agencies and Official About Metric

- Agency representatives on the Metric Operating Committee are the most appropriate sources to begin with. In some instances it may be fruitful to interview the previous MOC representative.
- Metric coordinators in each of the Federal agencies concerned should be able to provide additional information.
- Caution is advised with respect to interpreting the information received. The respondents may not be fully cognizant of metric activity in their agency or, depending on their interests, may somewhat distort the relative importance of identified activities.

- The Executive Secretary of the Interagency Committee on Metric Policy appears to be the most knowledgeable single source of information on metrication activities in the Federal Government. The post is currently held by Mr. John Tascher.
- Review the annual survey of the status of metric in the Federal Government carried out by the OMP. Federal Metric Status reports on each agency are issued annually.
- Distinguish between intended activities and those actually being carried out.
- Focus investigation on procurement activities.
- Be aware of the inherent pro-metric bias often found in status reports put out by advocacy groups.
- The U.S. Government Manual provides information on the activities of individual agencies.
- Metric coordinators for each agency can be identified through the ICMP's annual report or obtained from the Executive Secretary.

Guidelines for Approaching the Private Sector on the Status of Metric

By and large, one has to approach the private sector in complex, complementary and cross checking ways. Sources should include associations, trade journals, individual companies, and of course, the ANMC.

Interviews with the trade associations reveal that metric conversion is rarely a first order subject of importance. Often the association official is either not the correct person to contact, or has only vague and uncertain knowledge about what is going on. He, however, can often supply the names of key people who are effective sources of knowledge. More often than not, they are employees of other institutions or corporations.

Journal editors are more immediate sources of reliable information, but again metric is not likely to be a prominent issue on their agenda. It will, however, cross their field of view if substantial action is going on.

The key to obtaining information from any industrial area is to probe as many of the overlapping and crosscutting associations and journals as is practical. A particular industrial interest does not necessarily follow the SIC code. Interests are often fractionated and overlapping thereby requiring a complex of contacts. It is necessary to be aggressive in probing and not to be satisfied with an initial superficial answer.

The survey forms used in this study seem to be adequate (copies of the forms used are presented in Appendicies C through F). They are, however, somewhat lengthy and could probably be abbreviated for future use, particularly where the area has been previously investigated and there is already knowledge in hand.

Probing into the corporate sector is much more time consuming and difficult. In some organizations, it is difficult to locate the person most knowledgeable of metric activity. One must, therefore, use criteria of internal consistency together with cross checks against information supplied by associations and editors. In many cases also, legitimate confusion sets in when the degree of metric conversion is described or categorized by respondents at a different level of significance from that which would be described by researchers. Some seemingly minor introduction of a small level of conversion can easily be overlooked, therefore, if one does not aggressively probe. In the corporate interviews, it is advisable to discreetly use whatever information is available. For example, an unattributed quote, "it has been told to us", "it is widely believed," "It has been reported that," often stimulates a more complete and valid response.

In expanding on the approach discussed above, follow-up interviews with appropriate ANSI committees in metrically active areas would prove useful.

Recommendations

The following recommendations are presented as options for the Metric Commission in utilizing the results of this overview and for future U.S. monitoring activity.

1. Use of 1983 Overview Results

   a) The overview report data are particularly useful for assessing metric conversion interdependencies and interfaces bewtween Canada and U.S.A. MCC should identify specific USA constraints to be removed on a case be case basis. In co-operation with the Office of Metric Programs and the American National Metric Council, these constraints should then be reviewed with the objective of developing a mutually acceptable action plan for removing barriers to metric.

   b) The MCC should commission a study similar to this one, though perhaps more focussed, of Canadian industry. This would provide an overview of the Canadian situation and would identify many issues and barriers. This information would assist the MCC's successor organization plan and orient its activities. The Canadian overview study should be compatible with this U.S. study to facilitate coordination between the U.S. and Canadian conversion programs.

2. Future U.S. Monitoring

   The format, method, and documentation of the present study are all geared toward giving the MCC or its successor organization the option of repeating the overview in full or in part in future years. It is recommended that the U.S. overview be updated as follows.

   a) Routine Update

   This project consists of mailing the industry summary table and written assessments to respondents, followed by a brief telephone interview to update or correct the data. It would be appropriate to conduct such an update every second year. An extensive evaluation of results will not be required.

   b) Monitoring by OMC

   As an alternative approach to that suggested above, the MCC could negotiate with OMC a joint system of U.S. metric monitoring. If care is taken to ensure visible impartiality of methods and interpretation, this approach should find acceptance in both governments.

c) Monitoring for Sectors

The MCC has not yet conducted a metric study of an industry where the Canadian and U.S. elements are highly linked through trade or ownership. The MCC should consider commissioning such focused studies on both sides of the border if Canadian Sector Committees request them.

GLOSSARY

Division or Major Group:

These terms are based on the Standard Industrial Classification Code (SIC). The SIC system is used by the U.S. Government to report information on businesses. It has several levels. The first level is Divisions such as agriculture, mining, construction, services, and retail trade. The second level is major industry groups within these divisions such as machinery, transport equipment, health services. This assessment focuses most of its attention on the division and major industry group levels of the Classification. There are also SIC levels denoting industries, subindustries, and specific industry products.

Metric Activity:

Several different types of metric activity covered by this assessment include:

- Planning — sector-wide planning for conversion or planning by individual companies to convert to metric.
- Standards — the introduction of hard metric standards for use in industry or the conversion of dual labelling of customary standards.
- Labelling — the use of metric only labels or of dual labels on products.
- Hybrid — the production of items using both metric and customary components.
- Hard — the use of rational or convenient metric sizes or standards to produce products such as a 1200 mm by 2400 mm sheet of plywood instead of a 4 foot by 8 foot sheet of plywood.

SI Market Penetration:

Refers to the amount of the market for a specific product accounted for by products designed to SI units or labelled in SI units. In most cases other than food products, penetration refers to products designed to SI units.

Anticipated Momentum of Conversion:

Momentum refers to the relative pace of conversion activities. It is a qualitative evaluation of the rate of change in conversion activity. Thus, if there is a low level of activity currently but a significantly higher level anticipated in the near future, the momentum of conversion would be considered high. Conversely, a moderate to low momentum of conversion would indicate relatively little change in the anticipated level of activity.

Formal Metric Policy:

A formal statement by a government agency or a leading industry association stating the industry position on metric conversion. A pro policy includes policies which state that the industry will convert when the customers request metric.

Industry View on Metric:

The general position of the industry observers about the role of metric in their industry. Views range from actively opposing conversion to promoting conversion. Most industries adopt a wait and see or willing if the market demands attitude.

Actual Metric Conversion:

Change to making products or providing services in hybrid or hard metric units.

ANMC:

American National Metric Council - a private sector metric advocacy organization.

ICMP:

Interagency Committee on Metric Policy - the top metric policy making body for the U.S. government. It largely follows the lead of the MOC.

MOC:

Metrication Operating Committee of the ICMP - consists of the metric coordinators of each agency in the ICMP. This committee does most of the Federal Government's policy work relating to metric.

OMP:

Office of Metric Programs of the Department of Commerce - it is the office in the Federal Government responsible for metric.

NCSM:

National Conference on State Metrication is the network of people appointed as state metric coordinators. It operates largely as a response and dissemination mechanism for Federal metric initiatives.

NCWM:

National Conference of Weights and Measures — Association of public weights and measures officials as well as industry and other interested parties devoted to promoting uniformity among states in weights and measures.

APPENDIX A
THE STATUS OF METRIC IN UNITED STATES BUSINESS AND INDUSTRY

Includes excerpts from an ANMC Study entitled:

A Perspective on U.S. Metric
Transition Status, Dec. 31, 1983

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TABLE OF CONTENTS

APPENDIX A STATUS OF METRIC IN UNITED STATES BUSINESS AND INDUSTRY

SIC Division

- Agriculture A-1
- Mining A-10
- Construction A-13
- Manufacturing
  - Food Processing A-17
  - Tobacco A-22
  - Textile and Apparel A-24
  - Wood Products A-26
  - Furniture and Fixtures A-29
  - Paper A-31
  - Printing, Publishing and Allied Industries A-33
  - Chemicals and Allied Products A-35
  - Petroleum Refining and Related Industries A-38
  - Rubber A-42
  - Leather A-44
  - Clay, Glass, Stone, Concrete A-46
    - Structural Clay Products A-47
    - Glass A-49
    - Cut Stone and Stone Products A-52
    - Concrete A-54
  - Primary Metals A-56
  - Fabricated Metal Products, Except Machinery and Transportation Equipment A-60
  - Machinery, Not Electrical A-64
    - Engines and Turbines A-67
    - Farm A-69
    - Construction, Mining, Materials Handling A-72
    - Metalworking A-75
    - Food Products A-78
    - Paper A-80
    - Printing A-82
    - Miscellaneous Special Industry A-84
    - General Industry A-88
    - Computer Business A-91
    - Electrical and Electronic A-94
  - Transport Equipment A-97
    - Military Aircraft, Guided Missiles and Space Vehicles A-101
  - Scientific Equipment A-105
- Transportation, Communications, Electrical, Gas and Sanitary Services A-110
- Wholesale - Durable A-114

- Retail

  - Building Materials, Hardware, Garden Supplies, and Mobile Home Dealers A-117
  - General Merchandise Stores A-119
  - Food Stores A-121
  - Auto Dealers, Gasoline Dealers A-124
  - Apparel and Accessory Stores A-126
  - Furniture, Home Furnishings, and Equipment Stores A-128
  - Eating and Drinking Places A-130
- Finance, Insurance, and Real Estate A-132

- Services

  - Hotel A-135
  - Personal A-137
  - Business A-139
  - Automobile Repair A-142
  - Motion Pictures A-144
  - Amusements and Recreation Except Motion Pictures A-147
  - Health A-150
  - Legal and Social A-153
  - Education A-156
  - Museums, Art Galleries, Botanical and Zoological Gardens A-161

- Excerpts from a study by the American National Metric Council entitled: A Perspective on United States Metric Transition Status. December 31, 1983 A-162

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3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ■ Labelling ■ Hybrid ☐ Hard ■

OTHER Government, Public, and Statistics in metric.

FORMAL METRIC POLICY?
None ☐ Pro ■ Anti ■

INDUSTRY VIEW ON METRIC
Divided ■ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Pro act ☐

OTHER COMMENTS

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: AGRICULTURAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER Covers a range of services: scientific, management, and labor.

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

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DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: CROPS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY): Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER Export accommodation statistics

FORMAL METRIC POLICY? None ☒ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ☒ Wait & see ☐ Willing if market wants ☐ Pro act ☐

OTHER COMMENTS

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DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURAL (MACHINERY)

MAJOR GROUP: FARM MACHINERY AND EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☒	☐	☒	☒

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☒	☐

OTHER COMMENTS

Most of the heavy farm machinery and equipment has been converted or is in the process of being converted. Metric activity will be at low levels over the next 5 years.

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3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: AGRICULTURE

MAJOR GROUP: LIVESTOCK AND POULTRY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY): Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER ______________________________

FORMAL METRIC POLICY? None ☐ Pro ☐ Anti ■

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Prom activ ☐

OTHER COMMENTS

SUMMARY

AGRICULTURE DIVISION

1. Summary

The agricultural division report includes production of crops, livestock, and poultry; agricultural services, farm machinery and equipment. For most of the agricultural industry, use of metric weights and measures is negligible to non-existent. Exceptions include U.S. manufactured heavy farm machinery and equipment which is manufactured by international firms using predominantly hard metric components. Most noteable are earthtilling and harvesting equipment. Many scientific and technical agricultural services use, or are exposed to, metric in their work. The United States Department of Agriculture publishes some crop statistics in metric and assists farmers with metric-related export questions. Metrication will continue at low levels with most of the action appearing in farm machinery and equipment and in agricultural services.

2. Industry Covered

This summary covers everything within the farm gate, up to the point where the product enters the food processing stage or is shipped to the customer. The U.S. Standard Industrial Codes (SIC) major groups covered here include:

SIC 01 Agricultural Production -- Crops

SIC 02 Agricultural Production -- Livestock and Poultry

SIC 07 Agricultural Services -- Soil Preparation, Crop Services/Harvesting, Veterinary Services, Animal Services, Farm Labor and Management, and Landscape and Ornamentals

SIC 3523 Farm Machinery and Equipment (Part of SIC major group 35 - Machinery, except Electric)

SIC 08 (Forestry) and SIC 09 (Fishing, Hunting, Trapping) are covered in other summaries.

3. Current Status

a. Crops

- Domestic crops are weighed and measured in customary units. Export of raw food commodities frequently involves soft-conversion of the quantity, but seldom requires selling, weighing, measuring, or shipping in hard-metric.

- International commodity treaties and trading are encouraging familiarity of the agricultural community with metric crop statistics, forecasts, and planning information. Use of these metric figures is more typical of corporations, cooperatives, and large individual producers, than of the small farmers.
- Project M.U.M. (Modularization Utilization and Metrication) was begun in the 1970's to standardize and rationalize packing cartons, crates, and pallets used in transporting fresh and processed foods. The push toward metric sizes died in the late 1970's and was replaced by a move toward adoption of the closest customary equivalents. For the common international pallet size, 1000 mm. by 1200 mm., the closest customary equivalent is 40" by 48". Approximately 25% of the fresh fruit and vegetable growers now use this standard customary size pallet.
- The U.S. Department of Agriculture publishes selected crop statistics in metric and assists private industry with metric conversion and metric-related questions. This service is typically used in connection with exports of agricultural products.
- The U.S. Government is a large purchaser of domestic crops. Its practice of purchasing, weighing, and measuring these crops in customary units is expected to continue.

b. Livestock and Poultry

- Commercial weighing and measuring of domestic live animals exclusively uses customary measurements.
- The export market for live animals and for fresh, chilled or frozen meat and poultry products is small (less than 5% of total sales). Dual measurement declarations are occasionally used to satisfy foreign buyers' needs. The typical practice is for customers to specify customary units in their orders and for U.S. suppliers to ship according to customary weights and measures.
- The National Cattlemen's Association has a policy of metric resistance. The policy is founded on a belief that metric conversion would add unnecessary costs to the products and disrupt its constituency and consumers practices.

c. Agricultural Services

- Hard-metric is frequently used in veterinary medicine by professionals and technicians. All drugs are sold in metric quantities and applied according to the metric weight of the animal. Other scientific and technical disciplines use metric in varying degrees. Controlled animal breeding, agricultural research and development, weather forecasting, agricultural engineering, and chemical R&D and application are examples.

- Farm management officials and laborers have been exposed to limited use of metric, e.g. use of metric machines and statistics, but this exposure is not considered sufficient for agricultural chemical manufacturers and formulators to sell herbicides, pesticides, and fungicides in the U.S. in metric quantities even though the factories may be foreign or internally metric due to participation in the pharmaceutical industry. A leading deterrent to use of metric is the concern for potential human health or crop-toxic misapplication of exposures due to the chemical through measurement error. Agricultural chemical exports, however, are in hard-metric.
- Metric maintenance services are growing as domestic and foreign metric farm equipment penetrates the U.S. agricultural market.

d. Farm Machinery and Equipment

- A majority of U.S. heavy machinery and equipment is designed and manufactured in hard-metric. The conversion is product-by-product rather than sector-wide. The metrication occured in the 1970's spearheaded by large U.S. and U.S.-based heavy machinery manufacturers. These firms claim that conversion is now routine, noncontroversial, and provides an opportunity to expand world-wide sales.
- Support for this conversion is increasing among the technical and scientific communities. As agricultural machinery, equipment, and allied standards are updated, they are being dual-labeled with metric equivalents added. The American Society of Agricultural Engineers (ASAE) provides two voluntary hard-metric standards for their members and expects more in the future.
- Small U.S. manufacturers of agricultural equipment and machinery, with predominantly domestic sales, use customary measurements in their designs and production. They cater to a domestic market that prefers customary measurements. Unless customer demand changes or a company decides to tailor its machinery and equipment production to export markets, these products will remain customary.

4. Prospects for Conversion

Heavy farm machinery and equipment is largely hard-metric. Manufacturers indicate that they will continue the metrication process product-by-product. The momentum for metrication among other machinery and equipment manufacturers and within the rest of the U.S. agricultural community has declined since the mid to late 1970's. Increases in metric equipment maintenance services and the possible appearance of some foreign high-technology products will expand U.S. labor and management exposure to metric measurements. Examples include new moisture and crop characteristic sensors and robots. There is no indication at this time that many foreign buyers of U.S. raw agricultural products are demanding that the foodstuffs be weighed, measured, and shipped in hard-metric units. Until such time, exports will remain customary, and in selected instances, dual-labeled.

5. Sources

The most knowledgeable sources of information contacted include: The Farm and Industrial Equipment Institute for changes in the status of metrication in farm equipment and machinery, the American Society of Agricultural Engineers for information on voluntary agricultural standards, and the United Fresh Fruit and Vegetable Association for progress in conversion of cases, packages and pallets.

6. Additional Notes Provided by ANMC

The fresh produce industry is making a significant effort to reduce the number and variety of sizes of shipping containers used by its industry. Currently, more than 500 different size and shapes of containers are in use. Since international trade is an important and growing portion of the fresh produce market, there are growing pressures on the industry to use metric-dimensioned shipping containers, utilized on a metric pallet or slip sheet base.

In the United States, unit-load and transport package sizes are governed by American National Standard MH 10.1M-1980 which specifies five permissible unit-loads, together with 490 package sizes and 802 patterns that efficiently utilize the unit load dimensions. Criteria are provided for evaluating relative merits according to intended use. In response to the demands of its markets, in the early 1970s the major trade association serving the produce industry, the United Fresh Fruit and Vegetable Association (UFFVA) initiated Project MUM - Modularization, Unitization and Metrication. Five metric dimensioned containers and a unit-load base of 1200 x 1000 mm were selected by the industry for test and evaluation. An extensive test program was undertaken to evaluate the cost/benefit factors associated with Project MUM as related to type of produce, transportation mode, and growing area in the U.S. By mid-1983 it was apparent that the U.S. grocery industry was irrevocably committed to the 48" by 40" pallet size. Similarly, five metric-dimensioned containers were determined by test to be insufficient to serve industry needs, and 14 additional metric sizes were added.

The UFFVa remains committed to the objectives of Project MUM. The number of metric containers undergoing evaluation has been increased; retail store chains such as Safeway and Stop and Shop are testing Project MUM. There is no questioning the industry's commitment to eventual metric transition. Likewise, while the eventual goal of a metric unit base remains intact, the grocery industry in the near term has an extensive capital investment in automated storage and retrieval systems predicated on use of the 48" by 40" pallet. This will necessitate postponement of the consideration of a 1,200 x 1,000 mm base.

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38 KANAWHA STREET, N.W WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MINING

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY) Planning ☐ Standards ☐ Labelling ☐ Hybrid ■ Hard ■

OTHER Introduction of metric machinery in mines
Laboratory analysis

FORMAL METRIC POLICY? None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Promot- active ☐

OTHER COMMENTS

SUMMARY

MINING DIVISION

1. Summary

The mining sector covers all establishments engaged in mining. This includes the extraction of minerals, preparation of minerals at the mine site, and exploration and development of mineral properties. The purchase of imported extraction and ore moving equipment by U.S. mining companies has not altered industry practices substantially. No movement toward metric conversion is noted and the investment in imported machinery is not expected to rise.

2. The Industry

Mining includes the mining of metal (SIC Major Group 10), anthracite (11), bituminous coal (12), oil and gas extraction (13), and nonmetallic minerals, except fuels (14). Exploration and development are included, as are preparations done at the mine site, crushing, washing, flotation.

3. Current Status

- Imported mining machinery made to metric dimensions is available in the U.S. Importing companies report that their equipment, although metric, is made compatible with existing equipment, by converting readouts of safe loads and digging capacity to customary units. Use of such equipment is still limited and not expected to rise due to general economic conditions affecting the industry.

- The U.S. Bureau of Mines reports production and reserve figures for some mineral commodities, e.g. asbestos and copper. Neither the USBM nor the Department of Energy plan to convert all reporting to metric. Depending on the source, mining journals report figures in customary or metric units, making conversion charts available.

- Industry-wide metric conversion plans exist for the oil and gas industry, but no conversion activities have been noted. (See Petroleum Summary for more information.) Relatively little metric activity exists in exploration and extraction of minerals.

- Laboratory analyses supporting coal mining and other mineral R&D activities typically use metric measurement.

- Sources noted a few instances of individual mines converting to metric in the 1970's. No additional activity has occurred since the 1970's.

4. Prospects for Conversion

The mining industry is in a worldwide depression, which will tend to limit purchases of new machinery. A major manufacturer of excavating machinery reported that machines built to customary measurement were competitive in world trade. Sources contacted claim that U.S. manufacturers of mining machinery will have to convert readouts and product literature to metric to continue to sell their products abroad.

No industry-wide metric planning or metric activity, outside the natural gas and petroleum industries, has occurred. Few prospects for conversion exist.

5. Sources

Engineering & Mining Journal, Coal Age and Mining/Processing Equipment, are journals which could be consulted for knowledge of trends in the industry and referrals to companies making conversions.

The Mining Reclamation Council and the American Mining Congress would know of any metric activity in the industry, should it occur.

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3736 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: CONSTRUCTION

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	☐	☐	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

SUMMARY

CONSTRUCTION DIVISION

1. Summary

There is little current metric activity within the construction industry. This includes building and heavy construction and the specialty trades, i.e., plumbing and carpentry. While there was extensive discussion in the 1970's about construction metricating, there is little or no demand for metric standards or building materials by contractors today. A conversion schedule was prepared by the industry in cooperation with the ANMC, but the consensus of the associations and contractors contacted was that the schedule had been abandoned. There is a significant amount of metric activity among large, multinational contractors, but this activity is present only in their dealings with foreign clients. There is no indication that these firms consider metric measurement in their domestic construction work. Several of the sources contacted are convinced of the cost-effectiveness of metric conversion, and believe that the country will eventually metricate. The prospects for conversion in the near future, however, are very slim.

2. Industry Covered

The construction includes the following categories:

- o Building construction (SIC Major Group 15) includes general contractors and operative builders primarily engaged in the construction of residential, farm, industrial, commercial, or other buildings.
- o Construction other than building (SIC Major Group 16) includes general contractors engaged in heavy construction, e.g., highways, streets, bridges, sewers, etc.
- o Special trades contractors (SIC Major Group 17) includes contractors performing specialized activities, e.g., plumbing and heating, carpentry, concrete work, electrical work, etc.

3. Current Status

- o There appears to be little metric activity in the industries comprising the construction division. The only exception to this is in the area of international construction where firms working in foreign countries use metric. In these instances the indication is that hard conversion is generally used.

- o Few of the trade associations or journals contacted have a formal policy on metric conversion. Essentially, they respond to their members and there has been no demand expressed for metric activity.

- o The ASME recently (1983) published a "Boiler and Pressure Code" standard in metric units. There does not, however, appear to be a concerted move by standards writing organizations to make available hard metric standards. As they update the customary standards, however, metric equivalents are added.

- o The U.S. General Services Administration (GSA) - governmental body responsible for most government construction - has recently passed a resolution establishing parity between bids quoted in metric and those in customary units. (This change is covered in more detail in the government section.)

- o A USMB (1982) survey of nine major standards development bodies covering various industries, including construction, contributes a series of reasons why metric standards are not currently available in volume. The relevant points were as follows:

  - Metrication is not a major issue or problem for standards organizations.

  - Barriers to development and use of metric standards include the lack of demand, early costs and competitiveness, dual maintenance, safety concerns (too costly to test rationalized standards).

  - Conversion is proceeding relatively slowly.

  - The infrastructure does now exist to respond to demand for metric standards when they should arise.

- o The reluctance of state and local governments to convert their building codes and laws is frequently cited as a barrier to conversion.

- o In the late 1970's there was a flurry of interest in metric conversion in the construction industry culminating in the "Construction Community Metric Symposium" held in September of 1980. Since then, however, interest was waned.

4. Prospects for Conversion

Prospects for conversion to metric units in the U.S. construction industry do not appear positive in the short or medium term. Several forces have been identified as restraining the conversion process. The industry is not convinced that conversion to metric at this time is cost-effective. Where work in or for foreign countries is concerned, conversion is necessary and thus the industry's level of effort in competing internationally will be reflected in the domestic metric situation.

There appears to be a wait and see attitude among the various sectors of the industry. Some have sugested that the suppliers would have to initiate the process, others that the first step would come at the manufacturing level, while still others consider that conversion must start at the level of state, local and industry codes/standards.

5. Sources

The most knowledgeable respondents were from associations which were in contact with the ANMC. These individuals appeared to be more aware of the current situation. Specific associations which are knowledgeable about metric in the construction industry include: National Association of Home Builders of the U.S., Associated General Contractors of America, Construction Specifications Association. Among the trade journals, Engineering News Record is probably the most knowledgeable source available.

6. Additional Notes Provided by ANMC

Since the initial planning activity which occurred in 1980, the construction industry has been hit hard by the recession and this has put a halt to any major transition efforts which were underway.

However, in April 1983, a meeting of the original Construction Industries Coordinating Group (CICG) was held to review the status of metric transition. That Group, represented by more than 20 federal and private sector organizations involved in construction, concluded that planning toward a consensus of the industry should begin again.

Recognizing that the economics of transition will require the various sectors to convert at different rates, the CICG has restructured its planning groups into three distinct areas. These include heavy construction (dams, roadways), medium construction (schools, offices, hospitals), and residential (homes). These new divisions should be able to establish somewhat independent schedules for transition and should facilitate the process.

While it is unlikely that any major transition effort will occur over the next few years, aside from the large multinational companies, involved parties have agreed to begin planning.

The DoD, on its own initiative, recently developed a design criteria manual for construction which establishes hard metric dimensions to be used in all domestic and foreign military installations.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PROCESSED FOODS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ■ Labelling ■ Hybrid ☐ Hard ■

OTHER ____________________

____

FORMAL METRIC POLICY?
None ☐ Pro ■ Anti Pro soft conversion ■ Anti hard conversion

INDUSTRY VIEW ON METRIC
Divided ■ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promo activ ☐

OTHER COMMENTS

There is a medium degree of SI market penetration, but it is almost exclusively through dual-labeling food products.

SUMMARY

MANUFACTURING - FOOD PROCESSING

1. Summary

The processed foods report includes foods and beverages manufactured or processed for human consumption. The food processing industry is soft-converting. A majority of the processed foods sold in the U.S. are dual-labeled. With the exception of beverages, especially soft drinks, few processed foods are packaged in hard metric. Almost all export foods are dual-labeled; the size of the packages is rarely altered from the domestic package size due to the cost of running two product lines and the preeminence of the domestic processed food market.

The wine and distilled spirit industry is hard metric. Their conversion was Federally mandated in the 1970's by industry request due to a proliferation of bottle sizes and foreign competition. Similar Federal intervention is not currently foreseen for any other industry.

Soft conversion of the industry will continue. Hard conversion will be slow in appearing and will likely be coupled with introductions of new products and packaging technologies.

2. Industry Covered

Food and Kindred Products (SIC Major Group 20) includes:

- Meat and poultry products
- Dairy products
- Canned and preserved fruits and vegetables
- Grain mill products
- Bakery products
- Sugar and confectionery products
- Fats and oils
- Beverages (wines, liquors, soft drinks, flavoring extracts and syrups)
- Miscellaneous food preparations and kindred products

3. Current Status

Labeling

There is a continuing momentum for soft-converting products. As labels are updated, metric equivalents are listed. A majority of the products sold in U.S. grocery stores are dual-labeled. The nutritional content of these products are declared in metric as required by the F.D.A.

- To sell internationally, products, at a minimum, must be dual-labeled. Most persons contacted believe that export trade in processed foods will grow -- requiring more foods to be dual-labeled. These sources consider adoption of dual-labels sufficient to sell products overseas.

- There is no domestic demand for dual-labeled items. Many consumers do not realize that products are labeled in both systems. Manufacturers cite consumer familiarity and preference for customary sizes as the major inhibitor of metrication.

- The 1978 amendment to the U.S. Fair Packaging and Labeling Act permitted products to be dual-labeled with either system listed first -- so long as customary is included. Some states, however, are more restrictive in their practices. The Model State Regulation for the Method of Sale of Commodities 1983, adopted by the National Conference on Weights and Measures, suggests both recommended customary and SI weights and measures laws and methods for inspection of food commodities.

- The major food processing associations are in favor of their members dual-labeling their products. These associations oppose metrication (converting to standard hard metric package sizes) as too costly and unnecessary.

Packaging

- Almost no processed foods for domestic consumption are packaged in hard rational metric sizes. The wine and distilled liquors and some soft drinks are exceptions. Few export products are packaged in hard metric. Either a different label is placed on the domestic package or a single dual-label is used for both the domestic and foreign markets.

- There is some movement toward hard metric. Reasons for this movement stem from: purchases of foreign equipment, e.g. soft-drink packaging equipment from Europe, and large international manufacturers slowly standardizing their package sizes. Such movement is limited and product specific.

- The wine and distilled liquor industry completed metrication on 1/1/79 and 1/1/80 respectively. Their conversion was Federally mandated at industry request due to the proliferation of bottle sizes in the U.S. and extensive foreign competition. The conversion was two-fold: first dual-labeling, then hard metric. Federal intervention is not anticipated for any other products.

- Many U.S. processed food manufacturers selling goods abroad do so via foreign operation, rather than direct exports. Others ship bulk products overseas where they are then packaged and labeled. These practices alleviate much of the international pressure on the U.S. processed food industry to metricate. In addition, Federal, state, and local regulations require foreign processed foods to contain customary measurement declarations on their labels.

- The American National Metric Council's 1983 position paper setting forth principles for metric packaging of food and grocery products find "that there may be instances where it is inappropriate to convert certain packaged food products to a different metric mass or volume from the existing inch-pound configuration." Examples include products for a single use or designed for mix or reconstitution with other ingredients; products prepared in a container of limited capacity; and food products packed in standard containers of metal, glass, or other material that are intended for foods of different specific gravities.

Other Areas

- In the early 1970's several fresh and processed food associations and manufacturers joined to push international standardization of pallet, carton, and container sizes used in transporting food. The project, M.U.M. (Modularization, Utilization, and Metrication), lost momentum in the late 1970's and was replaced by a move to standardize sizes according to the closest customary equivalent, e.g. for the common international pallet 1000 mm by 1200 mm the 40" by 48" was emphasized. The metrication drive appears to have ended, although there is some speculation that increased pressure for efficiency in cubage use in international trade may revive it somewhat.

4. Prospects for Conversion

While the industry will continue soft-conversion on a product-by-product basis, metrication is not expected, except for isolated products. New technologies may permit some move to hard metric. These include fast heating technologies (FHT) and irradiation of foods. Use of laminated and plastic retort pouches and other plastic containers may facilitate conversion. The consensus of all persons contacted is that the industry will not change its current rate of metrication unless it is forced to do so.

5. Sources

The most knowledgeable food processing associations are the Grocery Manufacturers of America for an overview of most companies that manufacture brand food products for sale in U.S. grocery stores; the National Food Processors Association for information about packaging of products; and the American Frozen Food Institute for information on the state of metrication of frozen foods.

6. Additional Notes Provided by ANMC

In large measure, the trend to differing package sizes will be determined by the pace of technology in food packaging machinery. Increasingly, this machinery is either foreign-made, and hence metric, or it is U.S. made for an international market which is increasingly demanding metric capability.

So-called "hard metric" asceptic packaging for fruit juices and milk are appearing in U.S. stores. Major food packagers such as Ocean Spray, Johanna Farms, Borden, Coca-Cola, Del Monte, and Shasta market juice in 1 L, 250 mL and 200 mL containers and pouches. Individual 125 g packages of yogurt are also appearing.

ANMC's Food and Grocery Products Coordinating Group has a position paper entitled Suggested Metric Package Guidelines for Food and Grocery Products in the final stage of consensus development. It promulgates guidance for planning voluntary metric transition by manufacturers of prepackaged products. It espouses a product-line-by-product-line approach and lists a series of considerations which should be evaluated in making a decision to adopt to a metric package.

While the pace of consumer package industry transition to metric sizes will lag behind that of heavy industry, there are unmistakable signs that the transition is occurring with little consumer resistance or even attraction.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TOBACCO

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIVIIY (IF ANY)	■	■	■	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	■

OTHER COMMENTS

There has been a great deal of activity by cigarette manufacturers following their purchase of foreign metric cigarette forming equipment. All of the tobacco processing equipment and the packaging and forming of other tobacco products is customary.

SUMMARY

MANUFACTURING - TOBACCO

1. Summary

U.S. tobacco product manufacturers produce metric length cigarettes with metric forming and sizing machinery and have done so for many years. However, other tobacco products such as snuff, cigars, and pipe tobacco are produced and sold in customary units. Few additional conversions are anticipated for the near future.

2. Industry Covered

Tobacco Manufacturers (SIC Major Group 21) are engaged in manufacturing cigarettes, cigars, smoking and chewing tobacco, snuff and in stemming and redrying tobacco.

3. Current Status

- Cigarette forming and sizing machinery is designed in hard metric dimensions and is imported from Europe. Employee training and education is provided by the supplier. The cigarettes these machines produce are in hard metric sizes, i.e. 100 mm.
- Overseas, import duties are based on weight in metric terms. However, the statistics produced by the United Nations and the U.S. Department of Agriculture use both systems.
- The machinery used in drying and processing tobacco leaves is customary. Machinery used in manufacturing and packaging tobacco products -- other than cigarettes -- are customary.

4. Prospects for Conversion

Cigarette manufacturers consider production of metric size cigarettes as the extent of their conversion. Further conversion of processing equipment is not anticipated in the near future. Metrication in other segments of the tobacco industry, for other tobacco products and machinery, is not anticipated.

5. Sources

The best source of information in the tobacco industry is the producers themselves. Associations are primarily concerned with health/public relations issues.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TEXTILE AND APPAREL

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ■ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER ______________________________

FORMAL METRIC POLICY?
None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ■ Willing if market wants ☐ Pro act ☐

OTHER COMMENTS

SUMMARY

MANUFACTURING - TEXTILE MILL PRODUCTS AND APPAREL AND OTHER FINISHED FABRIC PRODUCTS

1. Summary

There is no metric activity now in U.S. textile mill products (i.e., fabrics, carpets, and thread) or in apparel and other finished fabric products (i.e., clothing factories). There are conflicting opinions as to whether or not apparel manufacturers will eventually convert to metric, but the general consensus among industry sources is that no metric activity will occur in the near future.

2. Industry Covered

Textile Mill Products (SIC Major Group 22) includes woven fabrics, knitted fabrics, carpets and rugs, yarn and thread and miscellaneous goods, such as felt, lace, upholstery fillings, etc. The Apparel Products covered (SIC Major Group 23) include men's and boy's clothing, women's, children's and infants underwear, hats and caps, girl's and infants outerwear. Also included are draperies, curtains, automotive fabrics and other miscellaneous fabrics.

3. Current Status

These industries completed work several years ago, in conjunction with the ANMC on plans for conversion to metric. Lack of demand by customers has deterred implementation of the plan. All U.S. manufacturing is done according to customary measurements. Production for foreign markets is generally handled by subsidiaries in other countries.

4. Prospects for Conversion

The textile manufacturing industry does not foresee any change in the current status until it becomes economically advantageous to increase the amount of exports. This is not expected to happen. In the clothing manufacturing industry, no metric conversion is expected either, although there has always been a desire for increased standardization of sizes which would accompany a move toward metric.

5. Sources

The American Textile Manufacturers Institute and the American Apparel Manufacturers Association were both heavily involved in the plans for metric conversion and are the best sources for future information on that topic. The Federation of Apparel Manufacturers is a good source of regulatory information.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: WOOD PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☒ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☒

OTHER ____________________________

FORMAL METRIC POLICY?

None ☐ Pro ☒ Anti ☐

INDUSTRY VIEW ON METRIC

Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☒ Promote/active ☐

OTHER COMMENTS

Metric production primarily for export markets

SUMMARY

MANUFACTURING - WOOD PRODUCTS

1. Summary

The wood products industry covers wood from growing and harvesting to production of basic wood commodities such as lumber and other wood products such as cabinets, structural members, and panel products. There is little metric activity in the wood products industries except where firms are exporting. Even in exporting, most wood products are made to customary dimensions. The U.S. is likely to become more interested in foreign markets for wood products over the next decade as the housing and construction market in the U. S. grows at a slow pace. This will lead to greater interest in metric production. However, the U.S. construction industry will continue to dominate domestic U.S. lumber and wood products producers' markets. They will continue to demand their products in customary units.

2. Industry Covered

The wood products industry (SIC major group 24) includes logging operations, lumber, flooring, structural wood members, millwork, cabinets, pallets, hardwood and softwood veneer and plywood, and particleboard.

3. Current Status

There is little activity in the wood products sector in metric production. U.S. markets, especially construction, dominate the activity of the wood producers. Construction continues to rely on customary measurement almost exclusively in the United States. A few producers in the U.S. have begun to produce metric sized wood for export - primarily exports to Japan and the rest of Asia. However, metric lumber or panel products exports are the exception rather than the rule.

There has been some metric planning activity for U.S. industry - especially in the development of standard metric sizes for use by U.S. industry. However, given the slow pace of conversion in the industry, these standards have not been widely used. In 1978, the ANMC sector committe dealing with wood products indicated that it would be a long time before metric became widespread in the wood products area given the dominance of the construction industry and the reluctance of the U.S.. market to use metric lumber.

4. Prospects for Conversion

Metric is likely to become more important to the lumber and panel products sectors of the wood products industry over the next decade. As the growth in domestic construction levels out, the industry will turn more aggressively and consistently to foreign markets - especially in Asia. To compete, the industry will need to market metric sizes of wood. Also, as new technologies enter the mills, such as variable setting saws, the capability to cut metric will increase.

However, the construction market and the overall U.S. market will continue to dominate U.S. wood producers' production. To maintain economies of scale in meeting the demands of this large market, companies will continue to focus on the high volume areas of production. Smaller runs of metric sized wood for export will continue to be at a disadvantage. Overall, the momentum for conversion in the wood products sector is relatively low.

5. Sources

The best source for metric information in the wood products industry is the National Forest Products Association. The large firms in the industry such as Weyerhaeuser are also good sources.

6. Additional Notes Provided by ANMC

As described in the October issue of the Northern Logger and Timber Processor, the American forest products industry, basically untouched by metric until recently, is starting to feel the impact. This pressure comes from both the manufacturing and the sales divisions. In manufacturing, many of the companies, even those that are solely domestic, are now purchasing imported equipment because of its unique machine qualities. This equipment not only often measures in metric, but even has gauges for hydraulics in metric units.

In the sales area, manufacturers are forced to seek international markets for their wood products because of the lagging economy of the U.S. in the construction industry. Often the manufacturer is faced with either trying to see products with American specifications to countries where only metric is spoken, or maintaining a costly dual inventory and production system.

Over the last several months, the larger multi-national companies in both the logging and wood products industries have begun to market metric products abroad.

For domestic wood products, transition will continue to occur slowly over the next several years until either the federal government as a major user establishes a strong metric policy or the major wood suppliers obtain a significant market share abroad to force transition of its domestic customers. Neither event appears likely in the foreseeable future.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: FURNITURE AND FIXTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ☐ Labelling ☐ Hybrid ■ Hard ☐

OTHER Some use of metric capable machinery and metric designed metal hardware.

FORMAL METRIC POLICY?
None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ■ Willing if market wants ☐ Pro acti ☐

OTHER COMMENTS

SUMMARY

MANUFACTURING - FURNITURE AND FIXTURES

1. Summary

There is little use of metric in production of furniture and fixtures in the U.S. This includes household, office, public building, and restaurant furniture, and office and store fixtures. Small amounts of metric hardware and machinery are imported. No increases in metric activity are expected in the future.

2. Industry Covered

Furniture and fixtures (SIC Major Group 25) includes household furniture, office furniture, public building and related furniture, partitions, shelving, lockers and similar store/office fixtures.

3. Current Status

U.S. household furniture manufacturing is done according to customary measurements. Manufacturers feel no current pressure to convert to metric because they are self-contained industries requiring no interfacing of parts from different sources. Some metric metal hardware is imported (usually concealed hinges) and requires the use of a metric drill bit. Most machinery in this industry is old, but is well maintained, and is producing only customary sizes. Much of the new machinery purchased is produced in Europe and is capable of producing in either metric or customary sizes. Manufacturers of office furniture, to meet foreign markets, produce metric dimensioned furniture through subsidiaries in foreign countries.

4. Prospects for Conversion

Conversion would occur if wood sizes changed, if paper sizes changed (necessitating change in desk drawer, file sizes), or if the industry pattern changed from self-contained manufacturing to specialized production requiring interfacing of parts from various sources.

5. Sources

The National Association of Furniture Manufacturers (household furniture) and the Association for Business & Institutional Furniture (office furniture) closely monitor their respective fields and would be knowledgeable sources for future metric information.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PAPER AND ALLIED PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ■

OTHER Only for export

FORMAL METRIC POLICY?
None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ■ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Prom acti ☐

OTHER COMMENTS

All activity in this industry is related to production of export-only paper products.

SUMMARY

MANUFACTURING - PAPER

1. Summary

There is little metric activity currently in the paper production industry. The small amount that exists is related to production for export. The industry includes the manufacture of pulps, paper, paperboard, and related paper products. No increase in metric activity is expected within the paper industry for the near future.

2. Industry Covered

The paper industry (SIC Major Group 26) is divided into firms producing pulpwood and other pulps, paper and paperboard, converted paper and paperboard products and building paper and board.

3. Current Status

Although metric conversion was considered by the industry in the mid-seventies, there is no current activity. Metric is used in exporting paper products. Pulp is sold to foreign customers in metric terms. Package designs and manufacturing is frequently metric for exports. Packaging is always custom-designed to client's requirements. While there was some discussion in the 1970's about the Federal Government requiring metric sized paper for its use, no changes in Federal policy are expected by industry.

4. Prospects for Conversion

Sources contacted do not expect any increase in metric activity in the near future. Increases would be tied to changes in domestic and foreign customer demand for metric paper products.

5. Sources

American Paper Institute represents manufacturers and converters of all kinds of paper and paper products. They have a technical standards division and a metric person, so would be a good source of future information in the paper industry.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PRINTING, PUBLISHING AND ALLIED INDUSTRIES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ☐ Labelling ☐ Hybrid ■ Hard ☐

OTHER Some imported metric designed machinery that produces customary sized printed matter.

FORMAL METRIC POLICY?
None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ■ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promot active ☐

OTHER COMMENTS

Printing machinery is increasingly metric in design. For more information, see the summary on printing equipment.

SUMMARY

MANUFACTURING - PRINTING, PUBLISHING, AND ALLIED INDUSTRIES

1. Summary

There is some use of imported metric designed printing machinery in the U.S., and use of chemicals packaged in metric quantities. There is no production of metric sized printing products, i.e. newspapers. The industry includes establishments engaged in printing and related services and in publishing printed matter, e.g., newspapers, books, etc.

2. Industry Covered

The printing, publishing and allied industries (SIC Major Group 27) are composed of 17 individual industries, all in some way involved in the production of printed products.

3. Current Status

Printing Industries of America had a committee on metric several years ago but inactivity in the industry lead to its abandonment. Printers follow demands of their customers. Suppliers of chemicals used in printing, package their chemicals in metric quantities. Printers follow metric guidelines in mixing these chemicals. Machinery, such as sheetfed presses, are imported from Europe and Japan and are totally metric in design. Some U.S. produced machinery is also metric designed, mainly for foreign markets. However, in all cases, they can produce products in either metric or customary measurements. U.S. printers use this machinery only to produce customary sized products because of no demand for metric sizes.

4. Prospects for Conversion

Customer demand would change the industry's attitude toward metric. Since new machinery can produce in metric, the industry feels conversion would be relatively simple. However, there are no indications today that the industry will move toward metric sizes in printing in the near future.

5. Sources

Printing Industries of America represents a large portion of the printing industry in the U.S. and is knowledgeable on the subject of metric.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CHEMICALS AND ALLIED PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	Hybrid	Hard
■	■	■	☐	■

OTHER ____________________

FORMAL METRIC POLICY?

None	Pro	Anti
■	■	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
☐	☐	■	☐	☐	■

OTHER COMMENTS

The pharmaceutical industry is metric and the bulk and specialty chemicals are largely metric. The rest of the industry is metricating slowly.

SUMMARY

MANUFACTURING - CHEMICALS AND ALLIED PRODUCTS

1. Summary

The chemical industry includes producers of basic chemicals and manufacturers of products by chemical processes, e.g., drugs, cosmetics, etc. The pharmaceutical industry is metric and has been for years due to international standards involving pharmacy goods. Bulk and specialty chemicals and plastic are largely metric. Other chemical products, e.g. paint, are dual-labeled. Finished chemical products, e.g. cosmetics,are customary.

2. Industry Covered

Chemicals and Allied Products (SIC Major Group 28) includes establishments producing basic chemicals and establishments manufacturing products by predominantly chemical processes. Classes of products include basic and specialty chemicals, chemical products to be used in further manufacture, finished chemical products such as drugs, cosmetics, soaps, and those used as materials for paint, fertilizer, etc.

3. Current Status

The use of metric measurements varies with the different areas of the chemical industry.

- Chemical & Engineering News, a trade journal, uses both customary and metric depending on the particular story. There is no education activity in metric for the staff and the style manual does not address metric usage. Prices are quoted according to the individual industry, i.e., sales to laboratories are quoted in metric; all other prices are quoted in customary.
- The American Chemical Society is a large professional/educational organization. They have a long-established pro-metric policy. They have provided metric education to members in the past but were unsuccessful. Metric activity now is nonexistent.
- Chemical manufacturers have a policy statement encouraging metric conversion. Metric measurements are used in the bulk and specialty chemicals industries but most products are labeled with dual measurements. The law requires labeling in English units for consumer products but metric units are often added. Ingredients are listed in metric.
- The pharmaceutical industry is reported to have been largely metric for years. The primary reason given is desire for worldwide uniformity in the pharmaceutical industry.

- Consumer products, such as cosmetics and fragrances, are labeled in customary units. Dry and liquid household products are labeled in customary units with metric equivalents. Aerosol products are usually in ounces. Soft conversion is being practiced in the paint industry. While no paint manufacturers are currently producing hard metric products, one company was reported to have converted, then switched back, following insufficient demand for metric paint sizes.

- Manufacturing plastic products follows the rest of the chemical industry. Bulk quantities are referred to in metric terms while finished products are manufactured and labeled in customary terms. The exception is that suppliers to General Motors (GM) must deal with metric blueprints and provide metric-sized products to GM. They conform to metric only when required. Equipment is largely imported and is designed in hard metric but is capable of producing products in either system.

4. Prospects for Conversion

The chemical industry is largely converted at the basic and specialty chemical levels. The pharmaceutical industry is also highly metric. Other sectors appear to be in various stages of metrication, with progress proceeding, but slowly. One factor driving conversion of this industry is international trade.

5. Sources

The best sources of information in the chemical industry are: the trade journal Chemical & Engineering News, and the American Chemical Society, for importance of metric to industry members; the American Pharmaceuticals Association, for policy and practices in pharmacy; the Proprietary Association, fur use of metric measurements in over-the-counter drugs; and, the Chemical Specialties Manufacturing Association, for manufacture of consumer, industrial, and institutional chemical products.

6. Additional Notes Provided by ANMC

In 1981, the ANMC Chemicals and Allied Products Sector Committee, which includes representatives from the producers and users of bulk and industrial chemicals, sought and received more than 70% agreement from the industry to establish 1984 as the date by which all bulk industrial chemicals would be shipped and billed in metric units. Since that time, through publications and individual presentations to trade associations, the Committee has sought to inform and educate the various manufacturers and users on preferred package sizes and units to be used. Additionally, the Committee has been instrumental in acting as a focal point for coordinating efforts with weights and measures officials to eliminate barriers to conducting trade and commerce in metric units. Over the next several months, the entire industrial chemical industry will be surveyed to determine the degree to which metric transition is occurring, and to develop a more concrete data base to better estimate when the process will be completed.

At present, while no comprehensive data exists on activity within the industry, it is doubtful that the Committee's original guideline of 1984 for a majority of the industry to ship and bill in metric will be achieved. However, use of metric measurements within the builk chemical industry does exist and definitely is increasing.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PETROLEUM REFINING AND RELATED INDUSTRIES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY): Planning ■ Standards ■ Labelling ■ Hybrid ■ Hard ☐

OTHER Measurement

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ■ Promote active ☐

OTHER COMMENTS

A US dominated industry indifferent towards metrication. Retail sales converted to metric and back again, following price rise and fall.

SUMMARY

MANUFACTURING - PETROLEUM REFINING AND RELATED INDUSTRIES

1. Summary

This summary covers petroleum refining and related industries, i.e., paving and roofing materials and miscellaneous petroleum and coal products. Also included in this summary are natural and bottled gas. Some companies in the oil and gas industry started converting gas pumps to liters in 1979. Almost all pumps have now been reset to sell by the gallon due to customer preference. They could be readjusted to liters, if conditions demanded. Production, refining and processing show low levels of metric activity, and reluctance to change. According to industry sources, the pressure for international standards and possibly of tariff barriers, will force a conversion, probably not before 1995 however. U.S. domination of the oil and gas industry ensures the use of customary units for the near future, even in overseas refineries. No metric activity is expected for petroleum and coal products in the next few years.

2. Industry Covered

Petroleum refining and related industries (SIC Major Group 29) includes the manufacturing of paving and roofing materials, lubricating oils and greases and miscellaneous petroleum and coal products, i.e., oils. Natural gas is included, for convenience in considering the oil and gas industry as a whole. Compressed and bottled gases are also noted.

3. Current Status

- Exploration and production are covered under mining.
- Refiners see conversion as costly and unwise at a time when capital is in short supply. Refinery equipment may have a life of 50-100 years. Partial conversions are thought to increase risk of control errors. Any conversion made have been the result of governmental pressure--real or perceived. Refineries report emissions in metric standards as required by the Environmental Protection Agency. Many overseas refineries were built to customary standards by U.S. companies.
- Pipelines - the cost of replacing pipeline is frequently cited as a barrier to change. External dimensions were considered more likely to be modified than internal if exterior connections were to be converted. Makers of liquid flow meters can offer metric readout, if necessary. They report however that in the oil and gas industry, there is little demand for metric units. Pipeline flows crossing the U.S.-Canadian border are routinely converted from metric (on the Canadian side) to customary (in the U.S.).

- Transportation - liquid natural gas arrives at U.S. ports in cubic meter tanks, passes through flow meters and is measured in customary quantities. Paperwork conversions are routine in transfer contracts.

- Gas pumps - a nationwide conversion of gas pumps to liter sales is an example of a metric conversion which did not hold. When gasoline prices rose rapidly, companies and dealers turned to liter pricing to eliminate errors in registering half prices on the pump. During the conversion, several major oil companies replaced aging pump equipment with more flexible electronic readout machines. When customers complained, gas pumps were readjusted to measure sales per gallon.

- Marketing - some lubricating oils and other packaged products are dual labeled for sale overseas.

Industry-wide Activity

Industry-wide conversion plans exist for petroleum and natural gas, and retail motor fuel dispensers. A metric applications guide and a conversion factors guide is available for the gas industry. The gas industry recently phased out its metrication committee, concluding there was no movement in the industry towards metrication.

Company Activity

By 1981 several oil companies (almost 100% of one oil company's 60,000 gasoline pumps) were selling by the liter. Today, 1983, only about 15% are still doing so. This includes pumps in Hawaii where liter sales are law. Prices were rising, gas was in short supply, when the company acquired its new generation of gas pumps. Customers did not complain at first. When they began to do so, dealers were given the option of resetting their pumps. Dealers in California actively promoted liter sales but were not noticeably more successful in overcoming customer resistance.

Standards

Standards writing organizations for the industry are ASTM, the D2 Committee (petroleum products), the F17 Committee (plastic pipe), the American Petroleum Institute and ANSI. The International Petroleum Institute has pushed for international standards. Some U.S. companies believe these standards may be applied as trade barriers at some unspecified date in the future, perhaps after 1989, the date set by the European Economic Community for all-metric trade.

Compressed and bottled gas

No formal metric conversion plan exists for this industry but an industry-wide metric committee exists, although not actively. Thus far, the supply of gas in customary sized tanks and vessels has been acceptable to U.S. and international companies.

4. Prospects for Conversion

Three years ago the Saudi Arabian company, Aramco, began a ten year metric conversion. No information is available at the moment on progress, although an industry source noted that the Saudis do not have a refinery and that because plants and equipment were built and installed by companies from all over the world, the country has a major problem of standardization and maintenance.

Factors for Conversion

- Relative ease of conversion and movement toward international trade in retail gasoline sales and packaged consumer goods, respectively.
- Younger engineers trained in metric measurement may influence industry. Publications more likely to use metric units in articles.
- Long term trend towards uniform international standards promoted by the International Petroleum Institute and oil producing, pro-metric countries.

Factors against Conversion

- Long life of refinery equipment
- Cost of replacing pipe, home gas meters and billing software
- U.S. dominance of oil and gas industry standards and practices
- No pressure for change in domestic oil and gas market
- Customer resistance to sales of gasoline by liters.
- Fear of control error in refineries, processing plants.

No major conversion can be expected of the oil and gas industry in the near future. An industry source believed a sudden conversion possible by the year 2000 if international pressure was sufficient.

5. Sources

Most calls to other sources were referred back to the American Petroleum Institute. The API keeps in touch with metric activity and can refer readily to individuals with specific knowledge. Activities of its members include exploration, drilling, refining, transportation and marketing of oil and natural gas.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: RUBBER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)	Planning ■	Standards ■	Labelling ■	Hybrid ☐	Hard ■	
FORMAL METRIC POLICY?	None ☐	Pro ■	Anti ☐			
INDUSTRY VIEW ON METRIC	Divided ■	Resist/ active ☐	Only if necessary ☐	Wait & see ☐	Willing if market wants ■	Prom acti ☐

OTHER Tires converted. Other rubber products are not.

OTHER COMMENTS

The tire industry is very pro metrication. The rest of the rubber industry, however, will not convert until customer demand requires conversion.

SUMMARY

MANUFACTURING - RUBBER

1. Summary

   This summary includes establishments manufacturing rubber products. Passenger car and light truck tires have been converted to metric sizes. Heavy truck tires are in the process of converting. There is no metric activity in the rest of the rubber industry, e.g., in producing belts, hoses for appliances, or footwear for consumers, nor is any anticipated for the near future.

2. Industry Covered

   The rubber industry (SIC Major Group 30) includes manufacturing of tires and inner tubes, hoses and belting, rubber footwear, reclaimed rubber and fabricated rubber products such as sponge, foam rubber, floof and wall coverings, etc.

3. Current Status

   In response to the auto industry, a rubber products manufacturer makes metric timing belts. Both customary and metric measurements are printed on hoses. The tire industry has completed conversion to metric over the past 1-1/2 years although rim diameter is still expressed in inches. Rubber belts and hoses for use in appliances are produced in customary sizes. Rubber footwear, being reactive to consumer choice, is produced only in customary sizes.

4. Prospects for Conversion

   The tire industry plans to convert heavy truck tires to metric within the next two years. No change in status expected in the rest of the rubber industry, as appliance manufacturers have no plans to convert and consumer familiarity with customary sizes is key to resistance to metric in footwear.

5. Sources

   The Rubber Manufacturers Association has 100% coverage of the tire industry and a large portion of other rubber producers. They are a primary source of future information on metric conversion in these industries.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANURACTURING

MAJOR GROUP: LEATHER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☒ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER The planning occurred on an internal level. The domestic leather industry participated in the discussion, but did not adopt the conversion plan.

FORMAL METRIC POLICY?
None ☐ Pro ☒ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ☐ Resist/active ☐ Only if necessary ☒ Wait & see ☐ Willing if market wants ☐ Promote active ☐

OTHER COMMENTS

SUMMARY

MANUFACTURING - LEATHER

1. Summary

There is no metric activity in the leather industry in the U.S., nor is any foreseen for the near future. The industry covers both leather tanning and finished leather products.

2. Industry Covered

Leather (SIC Major Group 31) consists of leather tanning and finishing, boot and shoe cut stock and findings, footwear except rubber, gloves and mittens, luggage, handbags, and other personal leather goods manufacturing.

3. Current Status

There is no metric leather production in the U.S. Leather manufacturers meet the needs of their customers, shoe and apparel industries, who are not requesting metric sized products. An international tanners organization recommended the adoption of metric measurements by the entire industry, worldwide, by 1983. This metrication plan has not been adopted by the U.S., nor is it being enforced by other countries.

4. Prospects for Conversion

Conversion to metric is not likely in U.S. leather industry. Demand would have to originate with the shoe and apparel manufacturers. Sources contacted do not foresee such demand developing in the near future.

5. Sources

The Tanners Council of America covers 90% of the companies involved in tanning and in providing supplies to tanners. They monitor the use of metric and would be the best source for future information in the leather industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CLAY, GLASS, STONE, CONCRETE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY) Planning ■ Standards ■ Labelling ■ Hybrid ☐ Hard ■

OTHER ______________________________

FORMAL METRIC POLICY? None ■ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC Divided ■ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Promote/active ☐

OTHER COMMENTS

The exception to the above analysis of these industries is in glass beverage containers which are being manufactured to metric dimensions for wine and liquor and in the process of converting for soft drinks.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: STRUCTURAL CLAY PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
☐ Planning ■ Standards ☐ Labelling ☐ Hybrid ☐ Hard

OTHER ASTM clay standards are dual-labeled.

FORMAL METRIC POLICY?
■ None ☐ Pro ☐ Anti

INDUSTRY VIEW ON METRIC
☐ Divided ☐ Resist/active ■ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Prom acti

OTHER COMMENTS

SUMMARY

MANUFACTURING - STRUCTURAL CLAY PRODUCTS

1. Summary

There is no metric activity in the structural clay manufacturing industry in the U.S. This includes clay brick, tiles, refractories, etc. No activity is expected for the near future.

2. Industry Covered

Structural clay (SIC 325) is a part of stone, clay, glass, and concrete (SIC Major Group 32). It consists of brick and structural clay tile; ceramic wall and floor tiles, clay refractories and other structural clay products.

3. Current Status

There was some discussion in the 1970's of metric use in the clay brick industry; the question of possible confusion involved in a changeover was a significant concern to the industry. ASTM clay manufacturing standards are dual-labeled. There is no demand for metric products in the U.S.

4. Prospects for Conversion

Conversion is not likely. As suppliers to the building industry, they will follow that industry's lead in the use of metric.

4. Sources

The Brick Institute of America monitors the industry and would be a good source of future information in regard to the manufacturing of clay brick. The Expanded Shale, Clay & Slate Institute is more representative of the raw materials industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: GLASS (Part of STONE, CLAY, GLASS, AND CONCRETE PRODUCTS)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

Most of the activity noted above is in the glass container section.

SUMMARY

MANUFACTURING - GLASS

1. Summary

The industry includes manufacturers of flat glass, glass and glassware, and glass products. It also includes the manufacture of ceramic products. The glass container industry is committed to metric conversion and is moving toward that goal. There is little metric activity in production of flat glass for domestic use, but it is dual-labeled for export. The ceramics industry is committed to metric at the research level, but there is no metric activity at the manufacturing level. There is no use of metric in the production of tableware in the U.S.

2. Industry Covered

The glass industry (SIC 321, 322 and 323) is a part of stone, clay, glass and concrete (SIC Major Group 32). This survey covers glass containers, flat glass, the basic ceramics industry (which fits into several categories including clay building products and pressed/blown glass tableware) and glass tableware.

3. Current Status

The glass industry is composed of several types of subindustries which vary in their commitment to metric conversion.

- The glass container industry is converting to metric. The conversion has been accomplished in liquor/wine containers and soft drink containers are in the process of conversion. Glass containers used for packaging other food products will be much slower to convert.

- Flat glass is produced largely in customary sizes for domestic consumption and is dual-labeled for exporting. Publications offer dual measurements. Standards are written with dual measurements, listing metric equivalents. Some metric products for the automobile industry are noted.

- A metric conversion is underway for ceramics at the research level. All literature is published in metric. The industry has a metric policy statement and publishing guide for metric. This conversion is not being carried through to the level of manufacturing metric ceramic products.

- Glass tableware manufactured in the U.S. is in customary measurements.

4. Prospects for Conversion

The prospects for conversion in the glass industry are more positive than for most other manufacturing sectors.

- The wine/liquor and soft drink containers comprise 70% of the production in this industry. Conversion was accomplished January 1, 1979 for wine bottlers and January 1, 1980 for liquor bottlers. Soft drinks are in the process of metricating. Conversion of other glass container manufacturers will be much slower in occurring.
- The flat glass industry will follow the construction and automotive industries in metric conversion. The construction industry shows few signs of converting to metric in the U.S. Metrication of the automobile industry, however, is pushing metrication of flat glass auto suppliers.
- The ceramics industry (which supports other glass and also building tile industries at the research level) has converted to metric measurements in their research publications and standards. While ceramic products are not presently produced in metric the development of metric standards and work at the R & D level is expected to influence the manufacturing of metric products.
- There are no prospects for conversion to metric in the glass tableware industry.

5. Sources

The best sources of information for each of the glass industries covered are:

- Glass containers — The Glass Packaging Institute is knowledgeable about the glass industry, related technical research, development of standards and plans for metrication. They develop standard drawings for glass containers which are used throughout the world.
- Ceramics — The American Ceramic Society is involved in research and standards for materials used in the production of glass-ceramic products and is a good source of information on metric at the ceramic R & D level.
- Class tableware — The Association of Glass and Pottery Manufacturers would know of any metric activity should it occur.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CUT STONE AND STONE PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER Use of some metric-designed machinery

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Pro acti
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

The SI penetration is in the form of hard-metric, dual-capable machinery. The availability of this machinery may result in limited metric activity in the future.

SUMMARY

MANUFACTURING - CUT STONE AND STONE PRODUCTS

1. Summary

There is little metric activity in the stone industry in the U.S. This includes the cutting, shaping, and finishing of stone for building and other uses. Few increases in activity are expected for the future.

2. Industry Covered

Cut stone and stone products (SIC 328) is a part of stone, clay, glass, and concrete products (SIC Major Group 32). It includes establishments primarily engaged in cutting, shaping, and finishing marble, granite, slate and other stone for building and miscellaneous uses.

3. Current Status

Customary measurements are used for production of stone in the U.S. Imported machinery, used by some U.S. manufacturers, is designed in hard metric and is capable of producing in metric or customary sizes.

4. Prospects for Conversion

Stone producers are suppliers to the construction industry. Barring metrication of the construction industry, there are no prospects for the stone industry converting to metric in the near future.

5. Sources

Allied Stone Industries Association represents a large portion of the major stone fabricators and quarriers and can provide information on any metric activity that may occur in the stone industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: CONCRETE (Part of STONE, CLAY, GLASS, AND CONCRETE PRODUCTS)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■ (partially)	☐	☐	☐

OTHER ______________________________

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Pro acti
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

SUMMARY

MANUFACTURING - CONCRETE

1. Summary

There is little metric activity in the concrete industry at this time, nor is any expected in the near future. The concrete industry includes the manufacture of concrete products from cement and aggregate.

2. Industry Covered

Concrete (SIC 327) is part of stone, clay, glass and concrete (SIC Major Group 32). It includes concrete block and brick and other products, ready-mixed concrete, lime and gypsum products.

3. Current Status

In the early 1970's the concrete industry developed a policy that standards would be written in dual measurements by 1983. That deadline will not be met; the impetus to do so has slowed down due to lack of metric activity in the construction industry.

4. Prospects for Conversion

As suppliers to the construction industry, conversion is unlikely unless that industry converts. There is no indication that such metrication will occur in the near future.

5. Sources

The American Concrete Institute is the standards writing organization for the industry and would be a reliable source of information in the future. Specialized producers are represented by separate trade associations such as the Pre-Stressed Concrete Institute and the Portland Cement Institute.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: PRIMARY METALS INDUSTRIES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom activ
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

The metric activity noted here is almost exclusively in supplying metal products to the original equipment manufacturing (OEM) industries, i.e., automotive industry. There is very little activity among primary metal manufacturers that do not supply the OEMs.

SUMMARY

MANUFACTURING - PRIMARY METAL INDUSTRIES

1. Summary

Primary metal industries include establishments engaged in smelting, refining, rolling, drawing, and alloying of ferrous and nonferrous metals and manufacturers of castings and other basic metal products. The primary metal industries are very active in metric in product areas that are tied to the automotive, earth moving and agricultural equipment, aerospace, and business machine industries. Examples of high volume basic metric steel products include steel sheet and plate and die casting (mostly captive automotive operations). The metric activity can be divided into products (metric according to customer request), factory process (which is typically customary involving conversion of the metric order to customary units for internal processing), and equipment (which is mostly dual-measurement capable and increasingly imported). Orders for metric products are expected to slowly rise. Internal factory processes, included paperwork and the actual manufacturing process, are metricating, but at a much slower rate than the products. Equipment is increasingly imported and hard metric; however, even customary metalworking equipment is capable of producing metric products. The rest of the primary metals industry is mostly customary-only, with few prospects or desires to convert. The industry is geared to customer demand. Until customers outside of the automotive and others listed above, begin to request metric products, the primary steel industry as a whole will not metricate.

2. Industry Covered

The Primary Metal Industries (SIC Major Group 33) includes establishments engaged in the smelting, refining, rolling, drawing, and alloying of ferrous and nonferrous metals; in the manufacture of castings and other basic metal products; and in the manufacture of nails, spikes, and insulated wire and cable.

3. Current Status

- o There is some metric activity in the primary metals industries. This activity is primarily in response to filling orders for large, multinational firms: namely the Original Equipment Manufacturers (OEM) including the automotive, earth moving and agricultural equipment, aerospace, and business machines industries.

- o Product interchangeability is the driving force behind these customers requesting metric sized metal components for their products.

- Almost all standards followed by these industries (unless the customer specifies differently) are customary. Even when metric products are provided, the tolerances and other factors are prepared according to customary standards.

- According to manufacturers of metric metal products, their typical practice is to receive the metric order, convert it to its customary equivalents, manufacture the product in metric with customary equivalents. The inclusion of equivalent customary weights and measures is largely for the benefit of the truckers and carriers, rather than for the customer.

- Few independent die casters have converted their operations to metric. However, captive die casters (with only one customer or a subsidiary of a larger firm) that supply the automotive industry are frequently 100% metric. Die caster standards published last January are in customary-only units.

- The metallurgical engineers are divided in their use and awareness of metric. Older engineers typically work (and write) in customary-only. Younger engineers are more familiar with metric, but still have few occasions to apply their knowledge within industry.

- About 40% of the publications submitted to a leading metallurgical publication are in hard metric. About 70% are dual-labeled. This rate appears to be average to high for similar publications. Metal statistics, for example, are published almost exclusively in customary by industry. The U.S. Bureau of Mines, however, does provide some international statistics in metric.

- Few metal foundries are using any metric in their activities, nor are most smelting establishments. There were informal metric discussions in the 1970's, however, few actions followed.

- The ISO has recently developed one steel casting standard -- four more are being worked on.

- A large part of the metal forging industry's products goes to support the aerospace industry, approximately 30%. As this industry metricates, the portion of metric metal forging orders has risen.

- According to a recent survey of the primary metals industries, approximately 5% of their products are metric. This figure is down from the 1980 high of almost 8%. Almost all of these metric products go to the OEM industries. The decline in metric metal production was due to economic conditions facing the OEM industries. As the economy picks up, the amount of metal products ordered by these industries should increase. Few metric products are expected to be ordered by other metal customers.

4. Prospects for Conversion

There is a growing demand for metric metal products in the U.S. As the economy improves for the original equipment manufacturers and as foreign companies move to the U.S., i.e. Honda, Toyoto, and Nissan, the prospects for conversion of the metals suppliers to these firms appears very bright. This metrication will begin with manufacturing metric metal products using customary standards and dual-capable machinery. The latter stages of metrication will involve changes in internal manufacturing procedures within these firms. The secondary metrication process will not appear to a significant degree for at least the next 5-10 years. For the rest of the primary metals industry, the prospects for conversion are dim. The metal suppliers manufacture according to customer demand. Outside of the OEM industries, very little to no demand for metric metals exists or is expected for the near future. If demand does materialize, however, conversion will be facilitated by the fact that much of both the customary and metric metalworking machinery used in the U.S. is capable of producing in either measurement system.

5. Sources

The most knowledgeable association for both primary metal and related metric information is the American Iron and Steel Institute. The Inland Steel Co. is an excellent contact on the status of metric metal supply and demand in the industry. Other good sources of metric information for segments of the industry include the Steel Founder's Society of America and the Forging Industry Association. Those segments that are not direct suppliers of the OEM industries tend to know less about metric use and awareness in the primary metals industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND TRANSPORTATION EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom activ
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

The metrication of this industry is directly tied to the conversion of customer industries. Suppliers of the automotive industry, for example, have a high degree of metric activity and metric parts. The most noteable example is fastener manufacturers. Suppliers to the construction industry, on the other hand, have lost the momentum for conversion.

SUMMARY

MANUFACTURING - FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND TRANSPORTATION EQUIPMENT

1. Summary

Fabricated metals include the fabrication of ferrous and nonferrous metal products (i.e. general hardware), fabricated structural metal products, and a variety of metal and wire products. There is very spotty metric activity within the fabricated metals industry. Extensive activity exists in metal fasteners; some activity persists on the national industry level, although at lower levels than in the 1970's; and some activity appears in dual labeling and converting of standards for metal lath and steel framing, reinforced steel, small arms and ammunition, expanded metals, and metal buildings. All activity noted in fabricated metals was tied to existing customer demand for metric products, e.g. metric fasteners, or perception of future demand. The expected future demand, for the most part, has not materialized for the majority of the industry. Few changes, except for primary suppliers of the automotive industry, are expected for the next few years.

2. Industry Covered

The fabricated metals industry (SIC Major Group 34) consists of establishments engaged in fabricating ferrous and nonferrous metal products. These include: metal cans, tinware, hardware items, fabricated structural metal products, fasteners, metal forgings and stampings, small arms and ammunition, etc.

3. Current Status

Extensive metric activity in the form of standards conversion, planning, and education took place in the 1970's within the fabricated metals industry. This activity was predicated on the belief that the U.S. was going metric and the fabricated metal suppliers would have to meet customer demands for metric. These demands, for the most part, did not materialize.

- In the 1970's major steel users, such as the automotive, earth moving and agricultural equipment, and business machine industries, announced decisions to metricate. Metal suppliers of these industries followed their customers' lead and began planning for conversion.

- The fastener industry is an example of an industry that has converted a significant portion of its operations to meet the new demand for metric. According to industry sources approximately 10-15% of fastener production is metric. Fifty percent of automotive, earth moving, and agricultural equipment fasteners are metric and approximately 4% of the rest of the industry is metric.

The fastener industry is the only industry in this division that has completed hard metric conversion of all its standards.

- Metal automotive stampings are largely metric. Again this metrication is tied directly to the metrication of the primary customer, the automotive industry.
- The concrete reinforced steel industry has a pro metric policy statement for conversion. They have actively worked with the ASTM to develop hard metric standards for reinforced steel. These standards are now being used by Canadian reinforced steel manufacturers, but, due to lack of demand, few if any U.S. firms are using the standards. The metric committee for this industry is now inactive. Conversion will depend on metrication of the construction industry.
- The metal lath and steel frame sector discussed metrication in the 1970's and, as a result, provided metric equivalents in their specification guide within the industry manual. About the only requests for or use of the dual-labeled specification guide is by Canadian firms. No activity is occurring in the U.S. today, nor is any expected unless the contractors and architects decide to metricate.
- The metal building manufacturers have dual-labeled their systems manual. According to industry representatives, however, metric is not being used in the industry. A great economic advantage would have to materialize before metal building manufacturers would be willing to convert.
- Opinions about metrication within the small arms and ammunition industry vary from willing to convert if market demands to vehemently opposed and willing to work against conversion. The industry has dual-labeled its standards, but the costs of retooling are considered too great to metricate without great demand. One representative cited concern over consumer safety as a factor in his association moving from pro metric in the 1970's to neutral today. Imports of metric products are slight, but all metric activity is being watched by several industry sources.
- In expanded metals, the only metric activity occurred in the 1970's with the issuance of a metric equivalent supplement to its standards manual. Expanded metal manufacturers will react to customer demand for metric, but will not convert until the demand materializes.
- Steel plate fabricators are in a depressed state due to economic conditions. According to industry representatives no metric activity is occurring in the sector--past or present. None is anticipated for the future.

- Metric is occasionally discussed in architectural metal association committee meetings, but only as a tertiary interest item. There is no noticeable metric activity occurring in this industry due to lack of customer demand.

- Several engineering components and metal product manufacturers and associations were contacted. No metric activity--past or present--was reported.

4. Prospects for Conversion

The metric activity present within the fabricated metal industry is closely tied to activities of customer industries. The example that is most noticeable is the fastener industry that is increasing its metric capabilities due to growing demand by the automotive, earth moving and agricultural equipment industries. Other industries that may have significant effects on the metric activities in fabricated metals are the communication and computer industries and the U.S. Department of Defense. Both groups have announced metrication plans. The reluctance of the construction industry, (except heavy earth moving equipment) and transportation industries to metricate are primary barriers to metrication of the fabricated metal industry. Continued conversion is expected for the industry, but at low levels.

5. Sources

The most knowledgeable association for the industry is the American Iron and Steel Institute. The metrication activities of the association have declined from the 1970's, but they are still a very good source on the extent of conversion in the industry as a whole. For specific sectors, the Industrial Fasteners Institute is very active in metrication of the fastener section and has published a hard metric fastener standards book. The Concrete Reinforced Steel Institute has published some hard metric standards for its sector. The Sporting Arms and Ammunition Manufacturers Institute is very knowledgeable about the extent of metrication activities/discussions within its sector. The following associations are very knowledgeable about past metric activities in their sectors and the prospects for future conversion: the Expanded Metal Manufacturers Association, the Metal Lath/Steel Framing Association, the Metal Building Manufacturers Association, and the Valve Manufacturing Association.

DIAGNOSIS OF METRIC SITUATION

MANUFACTURING

DIVISION: MACHINERY, NOT ELECTRICAL

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIIVIIY (IF ANY)	■	■	■	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	■	■	■	☐	■	■

OTHER COMMENTS

The degrees of metric activity past, present, and future vary widely depending on type of machinery. For more information, see specific diagnoses.

SUMMARY

MANUFACTURING: MACHINERY, EXCEPT ELECTRICAL

Note: This summary does not follow the general format of the other summaries. It is a summary of activity described in ten specific industries. The summaries for each of these industries follow.

This major group includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment and transportation equipment. This consists of engines and turbines; farm and garden machinery and equipment; construction, mining, and materials handling machinery and equipment; metal-working machinery and equipment; special industry machinery such as textiles, food, paper, wood, printing; general industrial machinery and equipment such as pumps, compressors, fans, etc.; office, computing and accounting machines; and refrigeration and service industry machinery.

An association representing most of the capital goods industry in the U.S. reports a wide range of metric activity in machinery manufacturing and that is verified by contacts representing specific areas of that industry. In general, companies that are large, internationally oriented and leaders in their industry have converted or are in the process of converting products to metric. The prevalent motive for this appears to be an effort to achieve economies of scale through uniform worldwide operations, interchangeability of parts and ease of exchange of drawings. Industries that are not converting to metric are primarily made up of small companies supplying the domestic market where there is no customer demand for metric machinery.

Industries which are heavily involved in metric activity include: heavy construction and farm machinery, suppliers of engines and industrial patterns to those manufacturers, and computing machinery. According to a trade journal, most engine manufacturers are producing metric products. This is in response to demand from auto manufacturers, truck manufacturers and heavy construction and farm machinery manufacturers. Drawings and designs are based on metric with customary equivalents added and sales literature expresses the metric dimensions. Major corporations are also manufacturing metric steam generators and hydroturbines for utilities.

In heavy machinery for construction and farming, conversion is about 50% according to an industry manufacturers association. A major manufacturer interviewed indicates that conversion is well established with 75-90% of their drawings in metric and 75-90% of the parts produced in metric gauge. Two of these manufacturers have begun production within the last year of metric diesel engines. The availability of metric capable machinery, use of more foreign machinery and a growing interest in export markets are promoting the use of metric according to one of these producers. In addition, technical regulations with regard to imports in other countries are a barrier to export of customary designed machinery.

In computing machinery, the status of metric conversion is slightly different. One large, international leader in the industry has achieved 100% conversion of new products, while others who are also large and international, have not begun to convert. The feeling was expressed by one of these firms that conversion is a problem that will have to be faced soon because their international business may require it. Again, economics of scale was mentioned in this regard. A large multi-product firm's overall policy is that divisions should convert where necessary. A printer division decided to convert to metric because a significant portion (25-30%) of their business was with the European Economic Community.

Overall, the machinery industry is well on its way to metricating its products and processes.

Details of activity in specific machinery industries are covered in the following ten summaries.

Additional Notes Provided by ANMC

* Metalworking Machinery and Equipment
* General Industrial Machinery and Equipment

Interest and progress in metric transition of this industry are comparatively recent. Increasing penetration of domestic markets by foreign producers, as well as increasing evidence of reluctance of foreign importerns to accept inch-pound machinery, is painfully evident to U.S. companies. The major trade association serving the industry, the National Machine Tool Builders ASsociation (NMTBA), in cooperation with ANMC's Machinery Sector Committee, is addressing the actions necessary for aiding voluntary changeover. NMTBA has been established a mechanism to work with customers and users to define the requirements for metric changeover. ANMC's Machinery Sector Committee, made up of machine tool manufacturers and producers of other machinery (pumps, compressors, etc.), has issued a Metric Changeover Guide for Machinery Manufacturers.

At the request of the Department of Defense (DoD), ANMC's Machinery Sector Committee is establishing priorities for metric conversion of machinery standards of selected DoD supply classes. Initially, several thousand standards have been identified for further analysis on the degree of measurement sensitivity, obsolescence of the basic equipment, new procurement, and other related factors.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY -- ENGINES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☒	☒

OTHER ______________________________

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	☒	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Pro acti
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☒

OTHER COMMENTS

SUMMARY

I. MANUFACTURING - ENGINES AND TURBINES

1. Summary

Engines and Turbines includes establishments primarily engaged in manufacturing steam, gas, and hydraulic turbines and turbine generator set units, and internal combustion engines. According to one journal, most manufacturers of engines are producing metric products. This is confirmed by the leading automobile manufacturer, whose engines are metric, except for a few older models still in production, and by a large construction machinery manufacturer who uses metric engines. An international manufacturer of turbines has been producing a hard metric hydro-turbine for several years. The conversion to metric in engines will continue as new products are designed, led by large manufacturers with international markets.

2. Industry Covered

Engine machinery (a part of SIC Major Group 35) includes steam, gas, and hydraulic turbines and turbine generator set units; and internal combustion engines.

3. Current Status

Most manufacturers have gone to metric in production of engines. Engineering drawings and designs are based on metric with customary measurements added. Diesel engines are designed in metric except for some older models still being produced by auto manufacturers. This conversion activity is being led by large, international firms making autos, construction machinery and farming machinery. In addition, major corporations are manufacturing metric steam generators and hydroturbines. A recent business magazine article states that International Harvester is making 6.9-liter diesel engines for Ford trucks and that demand during the past year has exceeded estimates due to a rapid shift from gasoline to diesel engines in medium-duty trucks.

4. Prospects for Conversion

Manufacturers of engines who supply large, international corporations are leading a conversion to metric dimensioned engines. Although small manufacturers are still using customary units, the conversion will continue. It may be modified, however, by a depressed economy facing many of the industries using these engines. An increase in demand for autos, heavy machinery, trucks, power plants, etc. would accelerate the trend towards metric conversion.

5. Sources

The best sources of general information on metric engines are the Equipment Maintenance Journal and the Diesel & Gas Turbine Journal. For more specific information, the manufacturers should be consulted--GM, Allis Chalmers, Caterpillar, etc.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, FARM

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACIIVIIY (IF ANY)	☐	■	☐	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	■

OTHER COMMENTS

SUMMARY

II. MANUFACTURING - FARM MACHINERY

1. Summary

Farm machinery includes establishments primarily engaged in manufacturing farm machinery and equipment including wheel tractors for use in preparation, planting and harvesting of crops and for performing other farm operations and processes. A majority of U.S. heavy machinery and equipment is designed and manufactured in hard metric. This conversion began in the 1970's led by large, internationally oriented firms and was accomplished product-by-product. It will continue as new products are developed, however, the momentum has slowed because of a depression in this industry. Small, domestic oriented manufacturers of farm machinery use customary measurements in their designs and production. Unless customer demand changes or individual companies decide to pursue the export market, these products will remain customary.

2. Industry Covered

Farm Machinery and Equipment (a part of SIC Major Group 35) includes establishments primarily engaged in manufacturing farm machinery and equipment, such as wheel tractors, balers, conveyors, elevators, grain stackers, harvesting machines, loaders, etc.

3. Current Status

A majority of U.S. heavy machinery and equipment is designed and manufactured in hard metric. The conversion is product-by-product rather than sector-wide. The metrication occurred in the 1970's spearheaded by large U.S. and U.S.-based heavy machinery manufacturers. These firms claim that conversion is now routine, noncontroversial, and provides an opportunity to expand worldwide sales.

Support for this conversion is increasing among the technical and scientific communities. As agricultural machinery, equipment and allied standards are updated, they are being dual labeled with metric equivalents added. The American Society of Agricultural Engineers (ASAE) provides two voluntary hard metric standards for their members and expects more in the future.

Small U.S. manufacturers of agricultural equipment and machinery, with predominantly domestic sales, use customary measurements in their designs and production. They cater to a domestic market that prefers customary measurements. Unless customer demand changes or a company decides to tailor its machinery and equipment production to export markets, these products will remain in customary dimensions.

4. Prospects for Conversion

Heavy farm machinery and equipment is largely hard metric. Manufacturers will continue the metrication process product-by-product. The momentum for metrication among other machinery and equipment manufacturers and within the rest of the U.S. agricultural community has declined since the mid to late 1970's. Increased in metric equipment maintenance services and the possible appearance of some foreign high technology products will expand U.S. labor and management exposure to metric measurements. Examples include new moisture and crop characteristic sensors and robots.

5. Sources

The most knowledgeable sources of metric information include the Farm and Industrial Equipment Institute and manufacturers of farm machinery such as Caterpillar and Allis Chalmers.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY; CONSTRUCTION, MINING, MATERIALS HANDLING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY): Planning ☐ Standards ☐ Labelling ☐ Hybrid ■ Hard ■

OTHER ____________________

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promote/active ■

OTHER COMMENTS

The exception to the above analysis is the mining industry machinery, which has a very low level of metric conversion activity and none is forecast.

SUMMARY

III. MANUFACTURING - CONSTRUCTION, MINING, MATERIALS HANDLING MACHINERY

1. Summary

The construction machinery industry includes manufacturers of heavy machinery used by the construction industry. The large international firms are converting to metric, while the small domestic firms are not. The reasons for conversion center around the desire for uniformity throughout their worldwide operations, which lead to economies of scale. Conversion in construction equipment will continue, led by these large international manufacturers. The current depression in construction will inhibit that conversion, however. In the mining machinery industry no industry-wide move towards metric is noted. U.S. mining equipment manufacturers design and produce customary machinery. A small amount of metric machinery has recently been purchased from Europe and Japan, but because of the depressed state of the industry, equipment purchases are not expected to increase noticeably.

2. Industry Covered

Construction, mining and materials handling machinery (SIC Code 353 a part of SIC Major Group 35) includes manufacturers of heavy machinery used by the construction industry, the mining industry and the associated equipment such as elevators, conveyors, cranes and materials handling trucks, trailers and stackers.

3. Current Status

Association representatives claim that conversion to metric is about 50-50 with large, internationally oriented firms leading the conversion. This is confirmed by interviews with manufacturers who say they are converting because of the worldwide activity of their business. In a large construction machinery manufacturing establishment, conversion is well established with 75-90% of the drawings in metric, and 75-90% of the parts produced in metric gauge. A hybrid product is actually produced but it is uniform throughout the world. Another producer estimates that 20% of production is substantially metric. They have recently begun producing a metric diesel engine in a joint venture with another firm. This engine will be phased-in over several years.

In the mining machinery industry the only metric activity seems to be in imported machinery, which is a small amount and is not expected to increase in importance. A European firm selling hydraulic excavators, lattice and telescopic boom cranes have to convert specs, literature, advertising, and publications into customary for sale in the U.S. Computers in the machinery convert the safe load information. However, the parts are in metric and the company must import the necessary tools for repair.

4. Prospects for Conversion

Manufacturers of construction machinery are well along in conversion to metric. Conversion is expected to progress slowly but steadily led by large manufacturers as foreign countries insist on more metrication. It is felt that complete conversion will occur eventually, although a depression in the construction industry will hold it back. The mining industry has introduced some imported metric machinery into operations, but it is not significant to conversion efforts. The industry does not expect any expansion into metric because of depressed economic conditions.

5. Sources

Since the large manufacturers are actually converting to metric, they are the best source of information on the status of conversion. The Mining & Processing Equipment Journal and the Engineering & Mining Journal offered the broadest base of information in mining machinery. Caterpillar and J. I. Case Co. are manufacturers involved in converting to metric.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, METALWORKING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	☐	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

IV. MANUFACTURING - METALWORKING MACHINERY AND EQUIPMENT

1. Summary

The machine tool industry is gradually converting to metric. The machine tool industry includes companies that make metal forming and cutting machinery as well as tools, dies, jigs, and other perishable cutting and forming tools. At present, about 10% of machine tools being sold are capable of producing in metric or customary units. Very few machine tools are designed in metric units. Fixtures, tools, and dies account for between 10% and 25% of the industry's sales. The major customers for these metric tools and metric capable machines are the automotive and other transport equipment industries as well as companies producing products for the military. The momentum for converting machine tools that are designed in customary units is low. The momentum for metricating dies and fixtures is low given the slow pace of conversion in the customer industries.

2. Industry Covered

Metalworking Machinery and Equipment (SIC 354) is part of Machinery (SIC Major group 34). It covers metalworking machinery - specifically machines that mold metals such as stampers as well as machines that cut metal such as saws, lathes, and drills. The machine tool industry also covers the fixtures, tools, jigs, dies, and other perishable tooling used on machine tools.

3. Current Status

The current status of metric in the machine tool industry is low market penetration with prospects for increasing penetration. Almost all metric activity in the industry involves adding metric capability to machines that are designed in customary units. In the dies and fixtures area, these perishable tools are made to the customer's demands. More customers - especially in automobiles, electronic equipment, and aerospace, are requesting metric fixtures and dies.

- Sales of metric capable machine tools averages about 10% of all machine tools. Some companies sell as much as 30% of their machines with metric capability.

- Many new product designs include metric capabilities.

- Sales of metric tools, dies, fixtures, and other perishable tooling average around 10% of all sales. Most companies sell less than 25% of their fixtures or tools in metric dimensions.

- The driving forces behind conversion of the machine tool industry are changes in the customer industries such as automobiles, aerospace, and electronics. Also, the desire of multinational machine tool builders to rationalize production across national boundaries and to sell to foreign markets stimulates conversion. The longevity of machine tools as well as the large portions of the U.S. industry that have not converted inhibit conversion to metric.

4. Prospects for Conversion

Momentum for conversion in the machine tool industry is strong with regard to metric capable machine tools. The capability is fairly easy to add to existing or new machines. The general movement to computer controlled machinery also makes metric capability a routine feature. Actual design of machine tools using metric fasteners, metric steel, and so on, is not happening and is unlikely to happen to any great degree in the near future. Metric fixtures, dies and other tooling will be more prevalent as more customer industries convert. Given the slow progress of conversion in those sectors that have not yet converted, the momentum for conversion of tools, dies, and fixtures appears to be slow.

5. Sources

For machine tools, the National Machine Tool Builders Association monitors metric developments in the industry. They are also the secretariat of the ANMC Machinery Committee. The National Tool, Die, and Precision Machining Association has done surveys of metric use in 1974 and 1981. They keep track of developments in the area of tools, dies, fixtures, jigs, and other perishable tools. Major companies in this field are also good sources of information about the industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, FOOD PRODUCTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY) — Planning ☐ Standards ☐ Labelling ■ Hybrid ☐ Hard ☐

OTHER ____________________

FORMAL METRIC POLICY? — None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC — Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Promote/active ☐

OTHER COMMENTS

SUMMARY

V. MANUFACTURING - FOOD PRODUCTS MACHINERY

1. Summary

Food products machinery includes machinery used for preparation, canning or packaging of food and beverages. U.S. produced machinery is mostly customary. However, in some industries, part of the machinery is purchased from foreign countries and is hard metric, e.g., 10% of biscuit and cracker machinery is imported hard metric. Most of the equipment is labeled with customary equivalents. A few firms i.e., canners, produce hard metric equipment for export. The soft-drink industry is using metric machinery for production of flexible metric containers. Metric conversion is occurring in soft drinks, but is not likely to increase in other food processing machinery.

2. Industry Covered

Food Products Machinery (SIC Code 3551) is part of machinery, nonelectrical (SIC Major Group 35). It consists of establishments primarily engaged in manufacturing machinery for use by the food products and beverage manufacturing industries in the preparation, canning, or packaging of food products; and parts and attachments for such machinery.

3. Current Activity

There were metrication discussions in the past, but these activities have ended. A small amount of metric dimensioned machinery is being purchased from Europe for use in the U.S., but it is labeled with customary equivalents. Metric equipment attachments are also dual-labeled. The machinery for Brik-pak and other flexible soft drink containers is from Europe and produces rational metric packages. Some U.S. firms sell machinery abroad and have converted certain product lines to produce hard metric equipment, i.e., fillers.

4. Prospects for Conversion

There is a gradual conversion occurring in the food industry toward dual-labeled products. Hard conversion has occurred in the liquor/wine industry and is occurring in the soft drink industry. This conversion is expected to continue which will increase the market for metric machinery. However, in other food products, metric conversion is being resisted.

5. Sources

The Dairy & Food Industry Supply Association, Inc. and the Food Processing Machinery and Supplies Association are knowledgeable general sources of information on the status of metric conversion in this industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, PAPER

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	☐	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

SUMMARY

VI. MANUFACTURING - PAPER MACHINERY

1. Summary

Paper, pulp, and paper products manufacturing machinery has some metric activity. Some paper manufacturers are importing machinery from Scandinavia, however, it is designed to U.S. customary standards. The larger companies do a heavy export business (up to 40% of their business) and make metric machinery for that market. Machinery manufactured for domestic use is designed in customary measurements. The packaging machinery business expects metric production to increase due to their large export market. Other paper producing machinery is not likely to increase conversion activity because of lack of customer demand.

2. Industry Covered

Paper Industries Machinery (SIC Code 3554, and part of Major Group 35) includes establishments primarily engaged in manufacturing machinery for pulp, paper and paper product industries.

3. Current Status

An association of packaging machinery claims that there is a large export market among the larger of its 220 members. These companies are designing and producing metric machinery for that market. Trade journals report that most machinery manufactured in the U.S. is in customary sizes. Some machinery is imported from Scandinavia, but it is designed to U.S. standards for customers here. In areas where there is limited competition, such as paper cup production, a manufacturer produces customary machinery for domestic use and for export. Literature for this product is dual dimensioned; blueprints are soft converted. Other large manufacturers produce only customary products for domestic sale and produce metric machinery abroad to meet export markets' needs.

4. Future

Industry representatives feel that a need exists to convert to metric. They will increasingly metricate because they have a large export market. The feeling is that metric production will increase in the future. Other industry people feel that there is a reluctance in the industry to switch to metric and do not see it happening soon.

5. Sources

The Packaging Machinery Manufacturing Institute is a good source of metric information on that part of the industry. For other types of machinery, it is best to talk to the larger manufacturers, such as Paper Machinery Corporation.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, PRINTING

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	■	☐

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

SUMMARY

VII. MANUFACTURING - PRINTING MACHINERY

1. Summary

The printing equipment association sources claim that 30-35% of their production is exported. Printing machinery is used for printing and bookbinding. Some of these machines are hard metric and some are dual-labeled. Imported machinery is in hard metric. As most of the machinery will produce in either customary or metric, demand does not depend on whether or not a machine is metric but rather on other factors which determine a source of supply.

2. Industry Covered

Printing trades machinery and equipment (SIC Code 3555 a part of SIC Major Group 35) is part of special industry machinery and includes establishments primarily engaged in manufacturing machinery and equipment used by the printing and bookbinding trades.

3. Current Status

Most printing mechinery manufacturers do some exporting of machines, film, plates, and presses, some of which are hard metric. Sheetfed presses are mostly European and Japanese manufactured and are metric. A manufacturer (German subsidiary) sells 95% of its product in the U.S. All of their machinery is manufactured in hard metric. They provide training programs for their employees; the purchaser has to learn to read metric measurements and to repair in metric. They have produced in hard metric for 1-1/2 years and feel it makes it easier to transmit drawings between the German parent company and the U.S. The machinery will produce in customary sizes.

4. Prospects for Conversion

Much of the printing machinery manufactured and used within the U.S. is metric. However, it is used to produce customary products. It is felt by industry members that conversion of the products will be difficult because of public and customer attitudes. However, a metric-producing corporation feels it will happen eventually.

5. Sources

The National Printing Equipment and Supply Association can provide general metric information. A survey of manufacturers would be necessary to achieve accuracy, as the metric production varies considerably.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY: MISCELLANEOUS SPECIAL INDUSTRY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	☐	☐

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	☐	■	■	☐	☐	☐

OTHER COMMENTS

There is extensive metric activity in the production of tobacco and amusement devices machinery. The other sectors have much less activity.

SUMMARY

VIII. MANUFACTURING - MISCELLANEOUS SPECIAL INDUSTRY MACHINERY

1. Summary

This section includes several categories of machinery, not covered elsewhere: Textile machinery, tobacco products machinery, plastics machinery, stone machinery, amusement machinery and air conditioning and refrigeration machinery. The major metric activity among these groups is in tobacco products manufacturing which converted to metric many years ago. Major manufacturers use metric machinery purchased from Europe for the actual production of cigarettes--filters, stores, makers, tippers, conveyors, packers, etc. The processing of the tobacco is done by customary machinery manufactured in the U.S. Manufacturers predict that ultimately all production will be done by metric machinery; U.S. manufacturers of machinery are resisting conversion. The other area of metric activity is in coin operated amusement devices such as video games and music machines. Video games which were originally developed in Japan are manufactured in the U.S. by manufacturers of other coin-operated machines. Since video games are metric, they are converting parts for other machines to metric also. Plastics machinery is imported in hard metric, although there is reluctance on the part of machinery manufacturers to think metric. Conversion is occurring slowly because of demand for metric parts by GM. In stone fabricating and quarrying, customary measurements are used; some machinery (drills, grinders, splitters, saws) are designed to hard metric. If the building industry converts, the stone making industry will be likely to, but that is not predicted now. Commercial air conditioning and refrigeration equipment is manufactured in the U.S. in customary measurements. Standards include dual listings and exporters publish literature in conversion terms, when necessary. Noticeable future conversion is not predicted. Textile machinery is manufactured in the U.S. almost entirely, and is not metric. Since it is felt by the industry to be expensive to convert, and since the textile industry is depressed, no increase is expected in export markets, therefore there will be no increase in the manufacture of textile machinery.

2. Industries Covered

Major Group No. 35, Special Industry Machinery, 3559-Tobacco products machinery; stone working machinery, plastics working machinery; Special Industry Machinery, 3552-Textile machinery; Refrigeration and Service Industry Machinery, 3585-Air conditioning, heating and refrigeration equipment; and Miscellaneous machinery, 3599-amusement machines.

Current Status

Tobacco Products: Cigarettes are manufactured in metric sizes and have been for many years. The cigarette making machinery is hard metric and is imported from Europe. Tobacco processing machinery is customary and is generally manufactured in the U.S.

Amusement Devices: Coin operated amusement devices such as video games, music machines and coin-operated pool tables are largely manufactured in metric measurements. Standards for metric video games have been adopted by U.S. manufacturers. These same manufacturers are in the process of converting other amusement devices, i.e., music machines. Repair parts and tools are metric. Standards published by the Federal Communications Commission for the industry are also in metric.

Plastics: Companies supplying General Motors are required to produce metric parts, but they prefer using customary terms and processes as much as possible to do so. Some of the equipment used is imported and is hard metric. Conversion is occurring slowly but with reluctance on the part of machinery manufacturers. The machinery which produces metric plastic bottles is frequently of customary design.

Stone: Stone quarriers and fabricators produce in customary measurement using customary equipment except in the case of some small machinery such as drills, splitters, saws.

Refrigeration, Air Conditioning: There is no metric activity in the production of refrigeration and air conditioning equipment in the U.S. The standards provide dual measurements and are based on ASTM documents which are in metric terms. Exporters publish literature with conversion terms when necessary.

Textiles: Textile machinery manufactured in the U.S., represents the majority of the machinery used in the industry, and is not metric. Because of a depression in the industry, conversion is not expected to accelerate. Where machinery is imported it is in hard metric. A State metric contact in South Carolina suggests that there is a substantial amount of German and Swiss textile machinery.

4. Prospects for Conversion

Tobacco processing machinery may be converted slowly to complete the conversion in that industry; but U.S. manufacturers are not planning to convert in the near future. Cigarette manufacturers would like to convert completely, but are not pushing the U.S. machinery manufacturers to do so. Amusement machinery manufacturers will continue metrication of their machinery. Metric machinery in the plastics industry will be likely to increase slowly in response to demand from large customers such as GM, although there is some reluctance on the part of manufacturers to switch. There is no conversion activity forecast in stone, textiles or refrigeration/air conditioning equipment.

5. Sources

Tobacco: Manufacturers of tobacco machinery such as Powell Manufacturing Co., and users such as R. J. Reynolds and Phillip Morris are the most knowledgeable sources of information on metric in the industry.

Amusement Devices: Amusement and Music Operators Association is a good source of metric information for that industry.

Plastics: Modern Plastics is a trade journal for the industry and can give an overview of the status of metric.

Stone: Allied Stone Industries Association monitors metric activity in that industry.

Air Conditioning, Refrigeration: The Air Conditioning and Refrigeration Institute is the standards writer for that industry and is a primary source of information on metric activity.

Textiles: The American Textile Machinery Association monitors metric activity in the industry.

JFCOATES INC.
3736 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, GENERAL INDUSTRIAL

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	☐

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot active
INDUSTRY VIEW ON METRIC	☐	■	☐	☐	■	☐

OTHER COMMENTS

SUMMARY

IX. MANUFACTURING - GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT

1. Summary

General industrial machinery includes items such as pumps, bearings, compressors, blowers and fans, industrial patterns, gears and mechanical power transmission equipment. Metric conversion in general industrial machinery and equipment varies among the different industries. Activity in fluid power products is limited to soft metric drawings with some hard metric as requested by customers. A compressor manufacturer uses customary components with the air end designed in metric. Fans and blowers are manufactured in the U.S. in customary units. Air conditioning and refrigeration equipment is manufactured in customary units. Industrial patterns are made in both customary and metric. Metric is used for auto and heavy machinery manufacturers who have converted. The gear industry is not advocating conversion to metric. Industrial heating equipment is manufactured in customary, usually, with occasional requests for dual labeling. Some industrial machinery manufacturers are responding to demand for metric equipment from large, international corporations. This is seen in industrial patterns and gears. But the percent of metric production is small and indicates only a slow trend toward metric conversion. Metrication is expected to continue slowly within the general industrial machinery and equipment industry.

2. Industry Covered

General Industrial Machinery and Equipment (SIC 356, part of SIC Major Group 35) includes pumps and pumping equipment; bearings; compressors; blowers and fans; industrial patterns; gears, drives and speed changers; and mechanical power transmission equipment.

3. Current Status

Pumps: Associations of pumps and fluid power products do not see a trend toward metric conversion. Activity is limited to soft metric drawings. Some associations prefer standards and literature in metric with customary equivalents, while others prefer customary only.

Bearings: More than 90% of the machinery used to manufacture bearings is not measurement sensitive. Of the other 10%, gauges, scales, etc. are customary. The products, bearings, are 2/3 metric because they were originally invented in Europe and were copied in metric by the U.S. Tapered roller bearings which originated in the U.S. are customary and have been copied as such throughout the world.

Compressors: A manufacturing division of a large corporation developed a metric conversion program in the 1970's which allowed for conversion where technically and economically practical. All parts were to be designed in hard metric by 1980. The conversion has been slower than anticipated. The air end of the compressor has always been designed in metric since it is designed and manufactured under license from a foreign country. All other components, such as gear, cover, control and engine, are in customary units. The suppliers to this manufacturer have had a few problems with metric conversion and perceive a few benefits, but overall, they support continued production using customary units.

Blowers, Fans: According to sources all manufacturing of blowers and fans is done in customary units. Standards were appended with conversion tables several years ago but there has been no interest from industry in using metric.

Industrial Patterns: Manufacturers of casting patterns for large auto, farm and construction machinery manufacturers make patterns from blueprints received from customers. All blueprints are in metric. If they are not some companies convert them to metric. Patternmakers are trained in metric. Some patternmakers produce auto engine patterns in metric, but other patterns in customary. Many companies can produce in customary or metric according to customer demand; much of their production is in customary measurements.

Gears: Large, international customers are pushing metric, but since demand for metric is only about 10% of the gears produced in this country it is not felt as a strong push. According to association sources, the industry is not advocating conversion. Export business is not at a high level and the expense of conversion is felt to be prohibitive.

Industrial Process Furnaces, Ovens: Most manufacturers of heat processing equipment for the capital goods industries do not use metric unless requested. Some multinational companies request dual-labeling, but this does not happen very often. Requests are in fact decreasing.

4. Prospects for Conversion

There is very little metric activity or plans to convert in these industries. The exception is in the pattern casting manufacturers, where patternmaking for large, multinational auto, farm and construction machinery manufacturers requires use of metric measurements. Other groups in this section seem willing to manufacture to metric if requested, but do not have much demand for it. There will probably be a slow, gradual conversion as equipment and know-how spreads in response to demand from the large machinery manufacturers.

5. Sources

Pumps - National Fluid Power Association
Bearings - Antifriction Bearings Association
Compressors - Ingersoll Rand Co.
Blowers, Fans - Air Movement & Control Association
Industrial Patterns - Nelson Pattern Co.
Gears - American Gear Manufacturers Association
Industrial Process Furnaces, Ovens - Dispatch Industries.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, COMPUTER & BUSINESS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER ______________________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote/ active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	☐

OTHER COMMENTS

SUMMARY

X. MANUFACTURING - COMPUTER & BUSINESS MACHINERY

1. Summary

The computer and business machinery industry is divided in their use of metric but not by international versus domestic business. A multinational corporation and leader in the field is 100% metric in its production at this time, while other large, multinational corporations are not producing any metric products. Some pressure is being felt by these firms and the consensus is that they will have to seriously consider development of a metric product in order to achieve economies of scale in international operations. Other large producers have converted some product lines, but not others. Metric conversion is likely to continue, led by the industry leader, because other international corporations are feeling the need for uniformity of operations throughout the world.

2. Industry Covered

Computer and business machinery (SIC Code 357, a part of SIC Major Group 35) includes office, computing, and accounting machines.

3. Current Status

At the association level, this industry has no policy and does not take a stand on metric conversion. Guidelines for conversion were developed, however, and some standards are dual-labeled.

A large manufacturer of computing equipment, and a leader in the industry, decided to covert ten years ago because of worldwide activity. Conversion was completed on schedule in 1983. All new products developed in the past ten years are hard metric. Manufacturing equipment is both hard metric and customary with metric capability.

Most other major computer equipment manufacturers have not converted to metric production. One firm produced a liquid crystal display in hard metric a couple of years ago, but is no longer producing that product. Others feel that international business may soon require metric products. Economies of scale would be realized by becoming more uniform throughout their operations. They feel that interfacing of parts is a current problem and will have to be faced.

A large multi-product firm's company policy is that metric conversion will take place as needed. The printer division decided in 1978 to convert to metric because a significant portion (25-30%) of their business was with the European Economic Community. There were some problems with buying metric parts, but these have decreased over the last three years. Some other firms are following this lead.

4. Prospects for Conversion

Large, international firms who have not converted are looking at the idea now because of the need for uniformity in their worldwide operations. Those that have some metric products plan to continue conversion as new products are designed and older products are discontinued.

5. Sources

The manufacturers such as IBM, Honeywell and Texas Instruments are the best source of information in this industry. Their metric activities and experiences differ considerably.

6. Additional Notes Provided by ANMC

There continue to be strong pressures to convert to metric in this area primarily because the requirements of international operations are felt by all the multinational producers. As yet, there appears to be no significant metric activity in the so-called "home computer" market although it is expected that the requirements for international operations will quickly come to play here. The second-largest domestic producer of home computers already has a planned program for metric changeover under development.

The commitment to metric transition by major manufacturers in this industry is irrevocable. The pace and direction are determined by marketing and consumer considerations.

ANMC's Data Processing and Office Equipment (DP/OE) Sector Committee has a Metric Changeover Guide for DP/OE in the final stages of consensus. A Software Transition Guide is now under development.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: MACHINERY, ELECTRICAL & ELECTRONIC

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY): Planning ☐ Standards ☒ Labelling ☐ Hybrid ☐ Hard ☐

OTHER ____________________

FORMAL METRIC POLICY?: None ☒ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☒ Resist/active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promote active ☐

OTHER COMMENTS

The industry is mixed with low activity in electrical apparatus and high activity in electronic products.

SUMMARY

MANUFACTURING - ELECTRICAL AND ELECTRONIC MACHINERY

1. Summary

Electrical and electronic machinery includes electric transmission and distribution equipment, electrical industrial apparatus, household appliances, radio and television equipment and communication equipment. Electrical units have always been referred to in metric terms, but this does not carry over into equipment. Standards are written with dual dimensions when revised but equipment such as motors, controls, welding apparatus and carbon/graphite products are still dimensioned in inches. Home appliances are manufactured entirely in customary dimensions in the U.S. In the radio/television industry, engineering work has always used metric. A major manufacturer has converted to metric because they obtain parts from the Far East. This conversion will continue as new products are developed. Conversion in electrical apparatus is not likely to occur soon because of the many, varied complex codes and tests involved throughout the U.S. However, cutbacks in the building of power plants in the U.S. is encouraging some large manufacturers of power equipment to seek business overseas which will promote metric conversion in the long run.

2. Electrical and Electronic Machinery, Equipment and Supplies (SIC Major Group 36) includes electric transmission and distribution equipment, electrical industrial apparatus, household appliances, lighting and wiring equipment, radio and TV equipment and communication equipment.

3. Current Activity

   - o Electrical Transmission - An association serving over 2000 power companies has a metric committee to monitor status of metric use in the industry. They do not advocate metric, but feel it is inevitable. The standards writing organization is including dual dimensions when standards are revised. However, transformers and switchgear are still manufactured in customary sizes.

   - o Electrical Apparatus - The standards writing organization for electrical products such as motors and generators, controls, welding apparatus, etc., has revised 60% of its standards to show dual dimensions. A few standards have been converted to hard metric: digital panel instruments, power supplies direct current output, safety standard for diagnostic ultrasound equipment and the guide for development of standards for motors and generators and x-ray measurement. In general, large international firms market metric products and small, domestic firms do not. According to industry sources companies that repair and rewind motors, generators, transformers and other electrical equipment say this equipment is still dimensioned in inches.

- o Home Appliances - An association for home appliance manufacturers and a leading manufacturer agree that there is no manufacturer of metric products in the U.S. Microwave ovens and room air conditioners are sold overseas, but are manufactured in foreign countries. Imports, such as Japanese microwave ovens are labeled in customary units.

- o Radio/TV - The industry association says that engineering work has always used metric. No conversion is necessary. A major manufacturer has no overall company policy; conversion is to take place where necessary. In the TV production division, it is felt to be necessary because parts are obtained in the Far East. They have been producing metric products for five years and will continue to convert as new models are designed and older models discontinued.

4. Prospects for Conversion

In the electrical power distribution and apparatus industry, it is felt that the manufacturers will lead conversion. There is little activity there now, but GE and Westinghouse have apparently accelerated their activities according to sources representing the industry. Customer acceptance is sought prior to conversion, however, this conversion will be slow in appearing. This will evolve slowly. There are many different codes, regulations, tests, etc., to deal with in the various states and localities which also deter metrication. Home appliance manufacturers have no plans to convert. The TV manufacturers will continue conversion as new products are designed and old products discontinued until total conversion is achieved.

5. Sources

The following sources are considered good sources of industry and related metric information: Electrical transmission - Edison Electric Institute, Electrical Apparatus - National Electrical Manufacturers Association, Home Appliances - Association of Home Appliance Manufacturers, TV, radio - General Electric Corporation.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TRANSPORT EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY) Planning ■ Standards ■ Labelling ☐ Hybrid ☐ Hard ☐

OTHER ______________________

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐

INDUSTRY VIEW ON METRIC Divided ☐ Resist/ active ☐ Only if necessary ☐ Wait & see ☐ Willing if market wants ■ Promote/ active ☐

OTHER COMMENTS

This industry has been active in preparing for metric conversion should it be desired by the customer. It is also monitoring the status of conversion in aircraft. However, very few people see the potential for the development of civilian metric aircraft given the opposition of the major U.S. airlines.

SUMMARY

MANUFACTURING - TRANSPORTATION EQUIPMENT

1. Summary

Metric activity varies in the transportation equipment industry from extensive use of metric in motor vehicles and trucks to no metric in ships and railroad stock. Bicycles have some metric parts and campers will be following the motor vehicle/truck industries. Prospects for conversion of motor vehicles and trucks are very favorable. The rest of the transportation equipment industry will be slower to convert.

2. Industry Covered

Transportation equipment (SIC Major Group 37) includes motor vehicles, ships/boats, railroad equipment, motorcycles, bicycles and campers. Aircraft is covered in a separate summary.

3. Current Status

The status of metric conversion within the transportation equipment industry varies considerably.

- Motor vehicle manufacturers, led by GM, are producing metric designed cars and metric parts. A planned conversion to metric has been in effect for ten years and is continuing. Manufacturers and car models are in various stages of this planned conversion. GM has converted almost totally in cars and light trucks (a V-6 and some V-8's are not metric yet). Ford is also in early stages of its metrication.
- Trucks appear to be moving toward complete conversion because GM is converting and because our large truck manufacturing facilities have been purchased by Volvo, Mercedes-Benz and Renault. Hino (Japanese) is starting up in the U.S. in metric. These firms are manufacturing here, setting up dealerships here, but also are importing from their European/Japanese facilities.
- State laws on truck size and weight are stated in customary units; freight hauled is noted in customary units. But, the Federal Highway Administration has published a proposed regulation to change the maximum vehicle width for trucks from 102" to 102.36" in order to conform with metric truck sizes. No other dimensions would be changed by this regulation. Small manufacturing firms have not converted to metric in the production of trucks, but large manufacturers are in the process of converting small and medium sized trucks.

- There is no planned program for conversion in the recreation vehicle industry. But this industry is a captive to the auto industry, so will probably convert eventually. Some suppliers do business overseas, which will increase the pressure upon them to metricate.

- Many bicycle parts are metric--derailleurs, nuts, bolts, etc. There is a large amount of international trade in parts. U.S.manufacturers have not carried the conversion any further than that. They manufacture and label the bicycles, tires, etc. in customary sizes.

- Railroads have not converted to metric. There was some discussion of metric several years ago. Interest has faded since then. Clearances on tunnels are labeled in customary and metric and dual measurements may be marked on cars for the Canadians. There are few exports in railroad equipment now and no importing of parts. Business in the past year has been down 44% in rail car deliveries.

- There is very little metric activity in shipbuilding. Some parts (pumps) are becoming available in metric. Any impetus is being provided by overseas business opportunities for suppliers. Some steel standards are written in hard metric. A questionnaire was recently circulated by the Japan Marine Standards Association on the use of metric. The policy of the industry is: per ASTM ruling, all customary units are soft converted.

- Most motocycles distributed in the U.S. are of foreign manufacture and are totally metric. Harley-Davidson is the only domestic manufacturer of motorcycles and except for bearings and a nut or two, are in customary units. A 100% tariff on imports in Japan inhibits the export market for H-D. Tariffs on Jananese imports in the U.S. was recently raised from 4.4% (which H-D felt was very unfair and detrimental to U.S. manufacturers) to 49%.

4. Prospects for Conversion

- Metric conversion in motor vehicles will continue. Industry sources project another five years to completion of conversion in passenger and light truck vehicles.

- In the trucking industry, resistance in the past came from mechanics who had to purchase new tools. Large manufacturers are in the process of converting trucks.

- No metric conversion is predicted in the railroad industry.

- No metric conversion is predicted in the railroad industry.

- The recreation vehicle industry is not very interested in the subject of metric conversion, but will convert as the trucking industry does.
- Conversion in bicycles is unlikely. Excessive import duties in foreign countries make exporting prohibitive.
- The shipbuilding industry will follow the lead of the Navy. No metric conversion is foreseen. As a conservative industry, the shipbuilders will be slow to convert.
- The distribution of motorcycles in the U.S. is divided along national lines. Japanese cycles are hard metric. The only U.S. manufacturer, Harley-Davidson, is not converted and is antimetric.

5. Sources

The best sources of information are:

Motor vehicles — Motor Vehicle Manufacturers Association

Trucking — American Trucking Association

Railroad stock — Association of American Railroads and the American Railway Car Institute

Recreation vehicles — Recreation Vehicle Industry Association

Bicycles — Bicycle Manufacturers Association

Shipbuilding — Society of Naval Architects and Marine Engineers

Motorcycles — Motorcycle Industry Council (distributors of imports) and Harley-Davidson.

6. Additional Notes Provided by ANMC

Major U.S. automobile manufacturers design and produce their cars in metric. GM completed its metric transition program in 1982; Ford will be predominantly metric by 1985; Chrysler cars are about 70% metric, and American Motors cars about 20%.

Increasing interest has been expressed in moving ahead with the metric changeover plans of heavy duty trucks and buses. In response to this ANMC is currently contacting interested truck and bus manufacturers to see if their managements wish to allocate the resources and personnel needed to activate an ANMC Heavy Highway Vehicle Sector Committee to evaluate the factors and considerations associated with metric transition.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: TRANSPORT EQUIPMENT - MILITARY AIRCRAFT, GUIDED MISSILES AND SPACE VEHICLES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)	Planning ☐	Standards ■	Labelling ☐	Hybrid ☐	Hard ■	
FORMAL METRIC POLICY?	None ☐	Pro ■	Anti ☐			
INDUSTRY VIEW ON METRIC	Divided ☐	Resist/ active ☐	Only if necessary ☐	Wait & see ☐	Willing if market wants ■	Promote/ active ☐

OTHER Department of Defense Procurement procedures are changing to increased use of metric in design of weapons systems

OTHER COMMENTS

There are several missile systems and space vehicles that are metric - either completely or substantially. Military aircraft are less likely to be metric at present. Pressures for interoperability with NATO nations and for international production are increasing the momentum of conversion in this sector.

SUMMARY

MANUFACTURING - AIR TRANSPORT EQUIPMENT AND PARTS

1. Summary

The air transport equipment industry includes large commercial transports, helicopters, general aviation aircraft, and other assorted products such as aircraft parts and engines. We also include in this category missiles and spacecraft. With the exception of missiles and space craft there is little metric activity among U.S. producers of air transport equipment. The U.S. has dominated the world aerospace industry for several decades. As a result its standards and practices have become the worldwide standard. While this is changing as foreign companies increase production, there is little pressure for U.S. aircraft producers to convert to metric. In fact, the major customers for U.S. commercial transports, the U.S. airlines, actively oppose the development of metric aircraft. The extensive system of spare parts, ground equipment, and tools associated with these airlines' operations is all in customary units. The major force for metric conversion of aircraft will come from the Department of Defense or from the development of superior foreign designs in metric dimensions. While the U.S. is unlikely to produce new aircraft in metric dimensions in the near future, the aircraft standards are being converted. The military emphasis on metric is most pronounced in the missiles and spacecraft area. Yet even there only a few missile systems are produced in metric units.

2. Industry Covered

The industry covered by this summary falls within Transport Equipment (SIC major group 37). It includes SIC 372 Aircraft and parts and SIC 376 - Guided Missiles, space vehicles and parts.

3. Current Status

Civilian Aircraft: U.S. industry is not producing metric civilian aircraft transports, helicopters, or general aviation and has no plans to produce such aircraft. Commercial transports such as the Boeing 757 and 767 are made to customary dimensions - from the avionics to the landing gear. Despite the competition from the hybrid metric aircraft of Airbus Industry, the U.S. does not plan to shift to metric production.

Military Aircraft: U.S. military aircraft are also made to imperial dimensions. There is one exception - the VTXTS Navy Trainer being co-produced by British Aerospace and McDonnell Douglas. The aircraft is metric except for the modifications being made by McDonnell Douglas. Again, despite competition from metric aircraft being produced by foreign nations, U.S. manufacturers intend to continue to make customary aircraft. The key uncertainty is the policy of the Department of Defense. If DOD requests a metric aircraft the industry will produce it. With the growing presence of dual capable machine tools, several industry people feel that the problems of producing a metric aircraft will not be as severe as once anticipated.

Missiles and Spacecraft: Missiles and spacecraft are more likely to be in metric than are aircraft. The Multiple Launch Rocket System a U.S. built system based on an Israeli design, is almost completely metric. Several other missile systems are also metric to some degree. Space vehicles are hybrid metric for the most part. Again, the key driver in this case is the need for interoperability with NATO nations and the move toward international production. Both of these factors are promoted by DOD and in turn promote metric production.

Engines and Parts: In the area of engines and parts, most remain in customary dimensions since the U.S. continues to lead the world in engine and sub-assemblies of aircraft. However, even here U.S. engine manufacturers are getting involved in joint international projects involving some metric production, e.g. the GE-SNECMA engine or the proposed international engine involving Pratt and Whitney.

4. Prospects for Conversion

Overall, the momentum for conversion in commercial aircraft is minimal. In military aircraft, the momentum is more substantial but uncertain. The policies of the Department of Defense are critically important to the future of metric in military aircraft, missiles, and space vehicles.

- The high costs of production and research as well as foreign governments' support for indigenous aircraft industries indicates a growing interest within the aerospace industry in international joint ventures. These ventures are likely to involve metric productions.
- The big growth markets for world aircraft sales are to the developing countries. Growth in the U.S. market is likely to stabilize. Competition for the developing nations' markets may spur the development of metric aircraft.
- The U.S. market will remain the largest single market for U.S. producers. It is unlikely that the U.S. airlines will seek metric aircraft.
- Growing pressure in international standards bodies may lead to greater use and development of metric standards for aerospace. The U.S. industry has already produced about 140 of its own metric standards for aerospace. Use of these standards is sporadic given the low hard level of metric production in U.S. aircraft industry.
- Military aircraft, missiles, and space vehicles are more likely to be metric in the future than are civilian aircraft. Pressures for international production and for interoperability are driving DOD interest in metric design. There is some indication the DOD policy on metric may be more aggressive in the future. However. DOD will not force industry to convert nor pay the costs of industry's conversion. For the most part, DOD will follow availability of metric in the marketplace.

5. Sources

The best general source on metric in the aerospace industry is the Aerospace Industries Association. For discussions on military aircraft consult the Department of Defense Metric Coordinator. For discussions on general aviation contact the General Aviation Manufacturers Association. Contacts with the main companies such as Boeing, McDonnell Douglas, General Dynamics, Bell, Sikorsky, Pratt and Whitney, Beech, Cessna, and others are also quite useful.

DIAGNOSIS OF METRIC SITUATION

DIVISION: MANUFACTURING

MAJOR GROUP: SCIENTIFIC EQUIPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning X■ Standards ■ Labelling X■ Hybrid ■ Hard ■

OTHER ______________________________

FORMAL METRIC POLICY? None ☐ Pro ■ Anti ☐ Photographic less pro-metric than other areas.

INDUSTRY VIEW ON METRIC Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ■ Promot-/active ■X

OTHER COMMENTS

Electronics have made soft conversion easy and practical.

SUMMARY

MANUFACTURING - MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS, PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS, WATCHES AND CLOCKS

1. Summary

Scientific and measuring equipment includes manufacture of instruments and related sensors and accessories used for measuring, testing, analyzing, and controlling.

The development of digital readout systems has enabled many manufacturers of control and measurement equipment to offer metric measurement without converting the internal and external dimensions of their products. For many, this has removed any pressure to make further changes. Optical equipment, designed around metric lenses, has long been produced to metric specifications. Segments of manufacturing and practice still await conversion. For the most part, however, the industry feels that adequate conversion has occurred and does not plan further metrication activities.

2. Industry Status

Scientific and measuring equipment (SIC Major Group 38) includes the manufacture of measuring, analyzing, and controlling instruments, photographic, medical and optical goods, watches and clocks. It also includes surveying and drafting, surgical, medical and dental instrumentation, equipment and supplies and ophthalmic goods.

3. Current Activity

- Process measurement and control equipment: Almost all manuturers supply equipment with dual readout capabilities and have done so for the last nine to ten years. In the U.S. market these instruments remain customary externally because they must fit domestic pipes and flanges.

- Scientific apparatus and instruments are manufactured to meet metric specifications when necessary. They are frequently dual-labeled.

- Optical goods: Lenses have always been manufactured using metric measurement; recently the temple pieces of eyeglass frames have been converted; however, fasteners have not.

- Optometry: Most of the measurement and instrumentation in this field is in metric, except for the 20-foot distance used to measure visual acuity.

- Ophthalmic goods: Lenses, lens care products, ophthalmic supplies are manufactured in metric sizes, usually dual-labeled for retail sale.

- Photographic equipment: Lenses are made in metric sizes but no other conversions are anticipated.

Industry-Wide Activity:

A metric conversion plan for the entire sector was approved by the U.S. Metric Board in January 1982 and endorsed by the ANMC in October 1981. The plan was prepared by the Instrument Sector Committee of the ANMC. Two stages toward complete conversion were seen: conversion of external characteristics, such as specifications and read-out, and stage two, conversion of the internal workings of instruments. The industry has moved into stage one and expects to remain there for several years.

Company Activity:

- A company manufacturing almost 1,500 different models of process control and measurement equipment has a metric policy and a metric steering committee which meets to solve problems which may arise. Most equipment has been capable of metric measurement for about ten years. Prime goal is to remain flexible enough to meet demands of customers. It was noted that international trade may not necessarily be a factor because some countries and some industries, oil, notably, continue in customary units, or relabel customary flanges in metric. Within this company's operations, a piece of equipment may be designed in the U.S., manufactured overseas and sold in a third country. Metric education is available for employees.

  No major internal conversions of equipment are planned. Apparently the lack of metric fasteners appears to be an unresolved issue.

- Companies supplying ophthalmic drugs generally produce in metric and dual-label. Laboratory equipment is metric as is a large segment of its manufacturing machinery.

- Major international companies supplying contact lenses, lens care products, sunglasses, microscopes and analytical instruments generally produce hybrid products. Advancements in electronics have facilitated conversion in this area. Those parts in metric dimensions include lenses, sunglasses, lens mounts, microscope threads, digital readouts. Some products are built overseas and imported by the U.S. Metric issues play no part in decisions to make equipment overseas, and there is no formal metric policy for the industry.

- U.S. manufacturers of street eyewear (excluding safety eyeglasses and ear protectors) supply less than half of the domestic market. Lenses and frames, imported and domestic, are made to metric dimensions; however, eyewear fasteners are not; therefore, U.S. and imported components are not interchangeable. An ISO standards committee has successfully resolved issues of nomenclature, frames, marking and stamping, among others, but has not yet discussed screw fastener conversion. The two or three companies involved in these discussions feel that the tooling necessary for conversion would prove a costly, unnecessary burden.

Standards:

ASME, ANSI, ISO, DIN standards are used by the industry. Microscopes are made to ASME standards, with an ISO metric standard governing thread sizes. In photographic equipment and supplies, the ANSI accredited committees on film and paper dimensions, measurement of photographic characteristics, photographic apparatus, photo chemicals, audio visual equipment, professional cinematography and television have, for the most part, accepted international standards of methodology and testing, but have not converted to metric measurement.

4. Prospects for Conversion

Manufacturers in this sector consider themselves followers, rather than leaders, in metric conversion. Their products, however, are largely hybrids. Their goal appears to be remaining flexible enough to convert a product rapidly when demand warrants. Gradual conversion is expected to continue.

Factors Promoting Conversion:

- Flexibility of manufacturers, willingness to adapt to customer demand.
- Extensive international trade, import and export.
- Existence of an industry-wide plan for conversion.
- Strong tradition of metric measurement in optical and laboratory analysis areas.

Factors Inhibiting Conversion:

- Certain areas, photographic, for example, have no reason to convert.
- Electronic conversion of readouts make substantial conversion unnecessary.
- Retooling for conversion, as for example in eyeglass fasteners, is considered a costly burden by domestic manufacturers.
- Resistance of optometrists to conversion of visual acuity measuring standard.

5. Sources

The Scientific Apparatus Makers Association (SAMA), represents the majority of manufacturers of process control and measurement equipment as well as the makers of scientific and laboratory apparatus and is knowledgeable on the status of metrication in the industry. The American Optometric Association is aware of all changes in the field of eye care, eye care services, and supplies. One company controls almost all the domestic market in photographic equipment and supplies and will provide current information on metric conversion.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: TRANSPORTATION, COMMUNICATIONS, ELECTRIC, GAS AND SANITARY SERVICES

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ■ Standards ■ Labelling ☐ Hybrid ☐ Hard ☐

OTHER ______________________

FORMAL METRIC POLICY?

None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC

Divided ☐ Resist/active ☐ Only if necessary ☐ Wait & see ■ Willing if market wants ☐ Promote active ☐

OTHER COMMENTS

SUMMARY

TRANSPORTATION, COMMUNICATIONS, ELECTRIC, GAS AND SANITARY SERVICES DIVISION

1. Summary

This division includes establishments providing to the general public or to other business enterprises passenger and freight transportation, communication services, electricity, gas, steam, water or sanitary services. Metric activity in this division is occurring in the area of communications which includes telephones, telegraph, radio and TV broadcasting. The Federal Communications Commission (FCC) is providing the impetus through soft conversion of regulations and the availability of dual standards. (See the government report for more information on FCC activity.) Both measurement systems are presently in use. There is no evidence of metric activity in other transportation industries such as railroads, highways, shipping and freight/warehousing. An air transport association that keeps in close touch with developments in metric reports an anti-metric feeling from the air transport industry due to transition period, duplication, and cost of retooling. Double standards are operating in many countries in air transportation. The electric utility industry takes the position that they will support orderly conversion effort. A recent survey by a metric committee within that industry indicates that conversion is at a very low level. There is a smattering of metric equipment within the utility industry, usually produced overseas. There is no metric activity in the natural gas transportation industry at this time. Metric activity in the sanitation industry is restricted to some dual labeling of designs for domestic sanitary facilities and metric drawings for foreign work. Since metrication in the transportation industries seems to be mostly a non-issue, little progress is predicted in conversion efforts.

2. Industry Covered

Transportation, communications, electric, gas and sanitary services (SIC Major Groups covered include: 40 through 49, except for 43, the U.S. Postal Service) includes rail, local, suburban, interurban, transportation; freight transportation and warehousing; water transportation; pipelines; transportation services; and electric, gas and sanitary services.

3. Current Status

- The associations representing the railroad industry reported no metric activity occurring at the industry level. Sources report that metrication is a non-issue for the railroad industry. No evidence of formal policies could be identified.

- The highways section revealed little activity since the late 1970's when Congress ended attempts to convert road signs using

Federal funds. At the level of transportation construction, engineers use customary only and are uninterested in converting. Due to their international membership, some publications usually contain metric equivalents. The informal policy is not to resist metrication and to encourage it when it is practical and increases uniformity.

- The motor freight and warehousing division reports much the same situation, though with some active resistance. Those who have international dealings are much more attuned to metric and use it when necessary. There is some maintenance required here for metric trucks.

- The air transportation section (airlines) are apathetic to actively resistant due to the perceived costs, inconvenience, and safety problems associated with conversion. (Metrication of the aerospace manufacturers is covered in another summary.)

- The natural gas industry shows no metric activity at the present time. A metrication committee in the industry has been phased out. Measurements and equipment are all described in customary terms. The industry members see metrication as costs without benefit. There is no metric conversion predicted. In addition, the Public Utilities Commissions which regulate gas companies specify in cubic feet. Special permission would be required to change this method of reporting.

- The electric utility industry has had a metric committee for three years which monitors metric activity. While the committee feels that metrication is inevitable, a recent survey of utility company members found that the conversion level is very low. The little metric equipment that exists tends to be produced overseas. The only large exception is a large eastern power plant which has metric hydroturbines. Industry members are not advocating metric, but are prepared to follow market and legislative demands.

- Communications include establishments furnishing communications services by wire or radio, and radio and TV broadcasting. The Federal Communications Commission (FCC), which regulates the communications industry, has provided some impetus toward soft metric conversion. They have begun to specify distances, heights, etc. in metric terms. They require that metric equivalents be used in all new standards. (See the government report on the FCC for further information.)

- The sanitary systems industry is using metric terms in measuring concentration of chemicals used, in design of foreign facilities and in the trade journals. Machinery tends to have dual labeled drawings. There are no metric dimensioned equipment or facilities in the U.S., however.

4. Prospects for Conversion

Metrication in the transportation, communications, electric, gas and sanitary services is proceeding very slowly. In each of these areas sources report that the impetus for metric activity will come from other sectors of the economy, from government, and from the necessities of international trade. None of these factors are expected to significantly affect these industries for the near future.

5. Sources

The most knowledgeable sources of information on the status of metric use within the transportation industries are: Association of Federal Communication Consulting Engineers, Edison Electric Institute, National Air Transport Association, Society of Naval Architects and Marine Engineers, Institution of Transportation Engineers, and American Gas Association.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: WHOLESALE

MAJOR GROUP: DURABLE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY) ☐ Planning ☐ Standards ■ Labelling ☐ Hybrid ■ Hard

OTHER ____________________

FORMAL METRIC POLICY? ■ None ☐ Pro ☐ Anti

INDUSTRY VIEW ON METRIC ☐ Divided ☐ Resist/active ■ Only if necessary ☐ Wait & see ☐ Willing if market wants ☐ Promo activ

OTHER COMMENTS

Automobile parts distributors sell metric parts. Photographic lenses are in metric. With these exceptions, wholesalers have little concern or knowledge of whether their products are metric.

SUMMARY

WHOLESALE - DURABLE

1. Summary

There is little available knowledge or interest regarding metric measurements at the wholesale level for durable goods. These products include furniture, lumber, jewelry, etc. Wholesalers generally follow the lead of the manufacturers-where products are manufactured in metric (usually exports/imports); wholesalers carry and sell them.

2. Industry Covered

Wholesale trade, durable goods (SIC Major Group 50), covers establishments primarily engaged in the wholesale distribution of durable goods. Areas included are automotive parts, furniture, lumber, photographic supplies, jewelry, home appliances, textiles and apparel and electrical products.

3. Current Status

There is no metric activity at the wholesale level with some minor exceptions. These exceptions are more important in manufacturing than wholesaling.

- No U.S. furniture is measured or labeled in metric; however, metric imports are increasing.
- Jewelry is measured in inches/pounds (necklace length, for example). Weight of gold and silver is measured in both metric and troy ounce. There is no conversion activity among wholesale jewelers.
- Photographic lenses and film have been in metric for years. Paper is measured in inches. No conversion activity is noted beyond products that are already hard metric.
- There is no metric activity currently or expected in home appliances.
- U.S. textile and apparel wholesalers handle a minimal number of metric products.
- The U.S. lumber industry deals exclusively in customary measurements for the domestic market. Wholesalers are seldom involved with export market.

- Auto parts wholesalers carry metric parts to service metric-designed automobiles. Metric information is provided directly from the manufacturer to the retailer. Wholesalers are only slightly involved in this interchange.

4. Prospects for Conversion

The wholesale industry will not lead any metric conversion activity, but will simply carry the products that are provided by manufacturers and demanded by retailers. The associations for the wholesalers do not predict any movement toward conversion other than in the export market.

5. Sources

The National Association of Wholesalers and Distributors is the largest and most knowledgeable association at the wholesale level. They investigated metric in the early 1970's, but have had few metric activities since then. Other wholesale level associations have less knowledge of metric activity in their industries and tend to refer requests to the manufacturers.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: BUILDING MATERIALS, HARDWARE, GARDEN SUPPLIES, AND MOBILE HOME DEALERS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)
Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER None

FORMAL METRIC POLICY?
None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC
Divided ☐ Resist/ active ☐ Only if necessary ☐ Wait & see ■ Willing if market wants ☐ Promo activ ☐

OTHER COMMENTS

SUMMARY

RETAIL - BUILDING MATERIALS, HARDWARE, GARDEN SUPPLY, AND MANUFACTURED HOUSING

1. Summary

There is no metric activity in building, hardware, garden supply, and manufactured housing (mobile home), nor is any expected in the near future.

2. Industry Covered

Building Materials, Hardware, Garden Supply, and Manufactured (mobile) Home Dealers (SIC Major Group 52) includes retail establishments primarily engaged in selling lumber and other building materials; glass and wallpaper; hardware; nursery stock; lawn and garden supplies; and manufactured homes.

3. Current Status

There is no metric activity in this industry. In the 1970's the construction industry established a metric conversion plan. Associations in this industry monitored the schedule and activities for signs that their industry might be required to convert. According to sources contacted, the ANMC Construction Sector Committee and construction industry metric groups have lost momentum and interest in converting. Without a push from construction, building material and hardware manufacturers have little interest in converting.

4. Prospects for Conversion

There are little to no prospects for conversion within this industry. Most manufactured housing standards are set by government regulation. The proposed standards that now are under review do not mention metric, and there is no interest within the industry for conversion. Garden stocks are customary and not expected to change. Few, if any, building materials or hardware items are dual-labeled or hard metric--unless for export-only. The prospects for conversion in any of these sectors is slim to non-existent.

5. Sources

The only association covering nursery stocks is the American Association of Nurserymen. The Manufactured Housing Institute is very knowledgeable about mobile home manufacturing and sales. The Door and Hardware Institute is among the more informed and helpful associations dealing with building materials and hardware.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: GENERAL MERCHANDISE STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY) Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER Sell metric products as demanded by customers.

FORMAL METRIC POLICY? None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Pro acti ☐

OTHER COMMENTS

SUMMARY

RETAIL - GENERAL MERCHANDISE STORES

1. Summary

The retail general merchandise stores (i.e., sellers of apparels, furniture, dry goods, etc.) are not concerned with metric issues today. There is no activity on their part to promote or monitor metric usage. Products are sold as the customer demands them. Generally, some imported products are designed and manufactured in metric and almost all U.S. manufactured products are designed and manufactured in customary sizes.

2. Industry Covered

General Merchandise Stores (SIC Major Group 53) includes retail stores which sell merchandise, such as dry goods, apparel, accessories, furniture, home furnishings, small wares, hardware and food. These stores are known as department stores, variety stores, general stores, etc.

3. Current Status

The National Retail Merchants Association and Sears Roebuck & Co. both were very involved with metric discussions in the 70's. Neither is active in promoting metric at this time. Some metric products, such as tools for working on metric designed cars, are in demand by customers. Other metric products, such as imported sewing machines and typewriters, are sold to consumers who neither know nor care that they are metric. Some products, such as apparel, have resisted conversion. In general, the retail industry follows the leadership of the manufacturing industry.

4. Prospects for Conversion

There is no push for conversion in the retail industry. They will market the products that customers demand and manufacturers produce. There is no increase in metric activity expected unless government policy or customer demand changes.

5. Sources

Sears Roebuck & Co. is particularly knowledgeable about the past and present metric activity at Sears and other retail stores. The National Retail Merchants Association is a good source of information on the activities and practices of retail stores.

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3730 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: FOOD STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☒	☐	☐	☐	☐

OTHER (Planning was largely in past.)

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promo activ
INDUSTRY VIEW ON METRIC	☐	☐	☒	☐	☐	☐

OTHER COMMENTS

Food stores stock and sell dual-labeled foods and a few hard metric packaged foods, e.g. some cereals and soft-drinks. Metric planning activity for conversion of weights (scales) is very low to non-existent.

SUMMARY

RETAIL - FOOD STORES

1. Summary

There is very little metric activity in retail food stores, beyond the selling of dual-labeled food products. No industry-wide metric discussions or metrication plans are expected in the near future.

2. Industry Covered

Food stores (SIC Major Group 54) includes retail stores primarily engaged in selling food for home preparation and consumption. It includes grocery stores and stores that sell meat and fish; fruits and vegetables; candies, nuts, and confectionary products; dairy products; retail bakeries, etc.

3. Current Status

- There is no metric activity taking place at the food store level. Food stores, however, are stocking and selling an array of dual-labeled food products and a few hard metric products, e.g., soft drinks. A majority of the processed food products sold in these stores are dual-labeled. Food stores see conversion of processed foods as a decision of the food manufacturers.
- There was some pro-metric discussions in the early 1970's centered around the usefulness of the metric system for standardizing pallet and container sizes and for unit pricing of goods for customer convenience in comparison shopping. The unit pricing system introduced in the 1970's filled the comparison shopping need. Increasing standardization of pallet sizes using customary sizes reduced the demand for metric pallets and cartons. Food stores' interest in metric declined following activity in the 1970's.
- Fresh produce, fruits, meats, and fish are all sold in customary units by the food stores. These stores are reluctant to adopt hard metric for the fresh products they weigh, measure, and label. They claim to be concerned over customer acceptance of metric products. There are no discussions to date about converting scales, etc. to metric within the stores.

4. Prospects for Conversion

There is a general consensus among associations contacted that the conversion of the U.S. to metric is inevitable. Most persons contacted feel that the metrication process will be slow and will be fought by the processed food manufacturers. Food stores will be very slow to change weights and measures on fresh foods. The legal side of weights and measure, one association pointed out, must be faced. Changes will be required in both state and federal laws. These changes will require long lead times. The cost of conversion and perception of customer reluctance to buy metric will continue to deter metrication within food stores for the next 5-10 years.

5. Sources

The most knowledgeable association on the state of metric activity by grocery manufacturers is the Grocery Manufacturers of America. The National Association of Retail Grocers of the United States and the Food Marketing Institute are both very knowledgeable about typical practices within U.S. grocery stores.

6. Additional Notes Provided by ANMC

* Retail Food

Traditionally, this segment of the distribution industry looks to and follows the lead of the manufacturer. Thus, it would be misleading to say that retail stores are not concerned with metric issues and do not promote and monitor metric issues. They make certain not to hinder the manufacturers who choose to introduce metric-dimensioned products in the retail marketplace. ANMC is not aware of any retailer who has refused to shelve and sell metric packaged products. Similarly, there are notable instances where large retail organizations are actively assisting organizations that wish to investigate metric transition-related costs and benefits. For example, both Safeway Stores and Stop and Shop are handling Project MUM test shipments and both have reported significant cost savings accruing from such use. As a result, both also are active boosters of Project MUM.

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3730 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: AUTO DEALERS, GASOLINE DEALERS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	■

OTHER ____________________

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

Activity is tied to the automobile industry. As the automobile industry metricates, the services (sale of cars and repair) of these groups will also metricate.

Metrication of gasoline pumps will be slow due to customer resistance.

SUMMARY

RETAIL - AUTOMOTIVE DEALERS AND GASOLINE SERVICE STATIONS

1. Summary

This report covers retail dealers selling new and used automobiles, boats, trailers, and motorcycles and their related parts and gasoline service stations. Both automobile dealers and gasoline stations are concerned about metric considerations due to their servicing and selling of metric automobiles. Requirements for metric training and new tools are not seen as presenting any problems to automobile dealers or service stations. Following California's lead, there was an attempt by some gasoline service stations to convert their pumps to liters in 1979, especially in the Northwestern states. These stations have largely reconverted to customary. Gradual increases in metric use are expected., tied to conversion by the automobile industry.

2. The Industry

Automobile dealers and gasoline service stations (SIC Major Group 55) includes automobile dealers and gasoline service stations involved in the sale and repair of new and used automobiles, boats, trailers, motorcycles and related parts.

3. Current Status

The current trend is a shift away from metric at the gasoline pumps. Electronic pumps can measure the flow either way. Dealers originally used the metric measurement when older pumps could not display prices over $0.99. This was especially notable in northwesten states bordering Canada. Examples of customers being cheated in the conversion and general customer resistance have resulted in many of the companies that converted to metric, switching back to customary.

The service and maintenance personnel at these stations and at automobile dealerships are familiar with metric tools, equipment, and parts as a result of metrication within the automotive industry. Metric parts and hybrid metric automobiles are sold by these firms.

4. Prospects for Conversion

Conversion will be tied to metrication of the automobile industry. It is expected to continue at steady levels. The slowest area to change will be the selling of gasoline by the liter. Horror stories from the 1970's and general customer resistance will continue to act as barriers to conversion of the pumps.

5. Source

The Independent Gasoline Marketers Council is knowledgeable on use of metric by service stations. Major automobile manufacturers are knowledgeable about the extent of metric in automobiles and subsequent dealer repair activities.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: APPAREL AND ACCESSORY STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER NONE.

FORMAL METRIC POLICY? None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC: Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Prom acti ☐

OTHER COMMENTS

SUMMARY

RETAIL - APPAREL AND ACCESSORY STORES

1. Summary

   There is no metric activity in ready-to-wear apparel at the retail level. This includes retailers of articles for personal wear and adornment, i.e., clothing. No activity is expected for the future.

2. Industry Covered

   Apparel and accessory stores (SIC Major Group 56) includes retail stores primarily engaged in selling new clothing, shoes, hats and underwear.

3. Current Status

   There is no metric activity in ready-to-wear apparel at the retail level.

4. Prospects for Conversion

   There is no indication that any conversion activity will occur.

5. Sources

   The Menswear Retailers of America (association) and the Women's Wear Daily (trade newspaper) would be aware of any metric activity on the part of their industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: FURNITURE, HOME FURNISHINGS, AND EQUIPMENT STORES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER None

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	☐	☐	■	☐	☐	☐

OTHER COMMENTS

SUMMARY

RETAIL - FURNITURE, HOME FURNISHINGS AND EQUIPMENT STORES

1. Summary

There is no metric activity in retail furniture, home furnishings or equipment stores. No activity is expected for the near future.

2. Industry Covered

Furniture, home furnishings and equipment stores (SIC Major Group 57) includes retail stores selling goods used for furnishing the home, e.g., furniture floor coverings, draperies, etc.

3. Current Status

The topic of metric measurement does not come up at the retail level in the furniture (including furnishings, home appliances, and electronic products) industry. There is no information collection at this level, nor have any concerns arisen. Educational activity has not occurred for retailers or consumers.

4. Prospects for Conversion

The retail industry would follow the lead of the manufacturers. There is no predicted change to metric at the manufacturing level. However, the International Home Furnishings Representatives and the Association of Bedding Manufacturers (see Wholesale section) did stress the increasing competition from imports which may have an affect on the attitudes of domestic manufacturers. Metric is not a consideration in this competition.

5. Sources

None of the associations/trade journals representing the retail level were knowledgeable about the use of metric in their industries. Since the manufacturers were more likely to be aware of any activity, the manufacturing associations are a better source of monitoring and prospective information.

DIAGNOSIS OF METRIC SITUATION

DIVISION: RETAIL

MAJOR GROUP: EATING AND DRINKING PLACES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)	Planning ☐	Standards ☐	Labelling ☐	Hybrid ☐	Hard ☐

OTHER NONE

FORMAL METRIC POLICY?	None ☒	Pro ☐	Anti ☐

INDUSTRY VIEW ON METRIC	Divided ☐	Resist/ active ☒	Only if necessary ☒	Wait & see ☐	Willing if market wants ☐	Prom acti ☐

OTHER COMMENTS

SUMMARY

RETAIL - EATING AND DRINKING PLACES

1. Summary

There is little metric activity in the eating and drinking places industry. While wine and distilled spirits are packaged in metric bottles and restaurants occasionally use metric designed equipment, the people who work in these establishments are solely familiar with working with customary measures. No activity is expected in the near future.

2. Industry Covered

Eating and drinking places (SIC Major Group 58) includes both eating places and drinking places (alcoholic beverages), namely retail establishments selling prepared foods and drinks for consumption on the premises, and also lunch counters and refreshment stands selling products for immediate consumption.

3. Current Status

There is no metric activity involving food and drink services. There is, however, some use of metric products, e.g., wine and distilled spirits bottled in metric sizes and some foreign restaurant equipment designed in metric. The fact that these items are metric does not influence services, nor does use of dual-labeled foods.

There was some metric monitoring by the food and drink services in the past, e.g., ANMC's sector committee, but these activities have ended and the committee is inactive. There is no momentum for conversion within the industry today. The only place that metric recipes or measurements may be used (in food services) is by military R&D labs.

4. Prospects for Conversion

It is unlikely that there will be any move to metricate the food and drink places in the future.

5. Sources

For information on drinking (alcoholic) places or on the transition to metric bottle sizes for the wine and distilled spirits industry, the National Licensed Beverage Association is the best source. The National Restaurants Association is the best representative of the eating places in the U.S. and measurement practices within food services establishments. The Council on Hotel, Restaurant and Institutional Education is the most knowledgeable organization on the status of metric awareness among food service educational facilities and graduates.

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DIAGNOSIS OF METRIC SITUATION

DIVISION: FINANCE, INSURANCE, AND REAL ESTATE

MAJOR GROUP:

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ☐ Standards ☐ Labelling ☐ Hybrid ☐ Hard ☐

OTHER There is limited metric quoting of certain imported commodities within the financial sector.

FORMAL METRIC POLICY?

None ■ Pro ☐ Anti ☐

INDUSTRY VIEW ON METRIC

Divided ☐ Resist/active ☐ Only if necessary ■ Wait & see ☐ Willing if market wants ☐ Prom acti ☐

OTHER COMMENTS

SUMMARY

FINANCE, INSURANCE, REAL ESTATE

1. Summary

Metric activity in the finance, insurance and real estate division is practically non-existent. The finance industry deals mostly in dollars where use of metric measurements would seldom apply. The exception, as in many other U.S. industries, is that in dealing with foreign countries the metric system may be used for quoting certain imported commodities. The insurance and real estate areas, though often dealing with measurements and weights, rarely have need to use metric measurements. No increase in metric activity is expected within these sectors in the near future.

2. Industry Covered

Finance, Insurance, and Real Estate is divided into SIC Major Groups 60, Banking; 61, Credit Agencies; 62, Security and Commodity Brokers, Dealers, Exchanges and Services; 63, Insurance carriers of all types; 64, Insurance Agents, Brokers and Service; 65, Real Estate; 66, Combinations and Real Estate, Insurance, Loans or Law; and 67, Holding and Other Investment Offices.

3. Current Status

Finance

- In financial investing, there is no use of the metric system.
- In banking, any use of metric would be an incidental by-product of foreign trade banking.
- Mortgage bankers in the U.S. deal with interest rates, property appraisal, insurance, etc., but exclusively in customary terms.
- Commodity units of trade reflect the terminology of the cash crop involved which is mostly based on U.S. industry and is referred to in customary measurements. Exceptions, e.g., cocoa and coffee, are imports and quoted in metric tons. Other imports, however, are seldom quoted in metric.

Insurance

- Metropolitan Life Insurance Co. publishes a metric table of weight/height. No other use of metric found in insurance.
- Property and casualty insurance measure space in customary terms.
- A fire protection research organization which deals primarily in foreign countries uses conversion tables when metric is required. No use of metric by that industry in the U.S.

Real Estate

- o An urban development research organization provides conversion tables in their publications. That is the extent of metric activity in the real estate field.
- o A multinational industrial realty survey firm requests all responses in square footage.
- o A fire protection association wrote all codes and standards with metric equivalents over five years ago. There has been no further metric activity.

4. Prospects for Conversion

Any metric conversion in real estate, mortgage banking, or property insurance would follow a conversion by the construction industry. Sources contacted do not feel that a conversion by the construction industry is likely in the near future. There is no indication there will be any use of metric in the finance industry, except for limited use in the commodities market.

5. Sources

Finance: American Bankers Association is the largest banking association in the U.S. and would be aware of any metric activity in that area.

Insurance: The American Council of Life Insurance is a large association with extensive research functions which monitors the industry. The American Association of Insurance Services is a knowledgeable source about the metric system and its possible uses within the insurance industry.

Real Estate: Urban Land Institute is a research organization for land development and would be aware of any metric activity in that field. The Industrial Development Research Council monitors the industry and is interested in following metric activity.

6. Additional Notes Provided by ANMC

* Insurance

A large life, accident, health, auto, liability, commercial and personal insurance company reports that metric measurements are used in three areas within the company — industrial hygiene, toxic chemical measurement of hazardous substances, and loss control engineering in plant inspection, consumer liability, and occupational safety and health measurement.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: HOTEL SERVICES (SIC MAJOR GROUP 70)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	☐

OTHER A report on metrication was prepared -- no subsequent action taken.

	None	Pro	Anti
FORMAL METRIC POLICY?	☒	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom activ
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☐

OTHER COMMENTS

SUMMARY

SERVICES - HOTELS, ROOMING HOUSES, CAMPS, AND OTHER LODGING PLACES

1. Summary

There is no metric activity in the hotel service industry, nor is any anticipated in the near future. The industry covers lodging establishments, camps, and trailer parks. For information on food and beverage services associated with hotels, see the summary below under eating and drinking places.

2. Industry Covered

Hotels, rooming houses, camps, and other lodging places (SIC Major Group 70) includes hotels, motels, and tourist courts; rooming and boarding houses; camps and trailering parks; and organization hotels and lodging houses, on membership basis.

3. Current Status

The lodging industry does not oppose metrication, but since it is not seen as affecting them directly, it is a non-issue. About two years ago an ad hoc committee was established to examine the affects of metrication on the industry. The report, completed approximately a year and a half ago, was prepared in cooperation with ANMC. It provided a general overview of planned and present metrication by other U.S. industries. No metric action has taken place within the lodging industry since that period.

4. Prospects for Conversion

The industry is in a wait and see mode. If food products, construction, or other industries metricate, then the hotel/lodging industry would be affected by the products of those industries. The hotel industry would adapt accordingly. Barring metrication of related industries, no action is expected for the hotel/lodging service industry.

5. Sources

The best source of information on the hotel industry and on awareness and use of metric within the industry is the American Hotel and Motel Association. For information on the education of persons working with food services, hotel lodging, or tourism, the Council on Hotels, Restaurants and Institutions is a good contact.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: PERSONAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	☐

OTHER The only metric activity found in this sector is within photograp~~hic~~ studios. They use some metric products, but their services are basically customary.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom acti
INDUSTRY VIEW ON METRIC	☐	☐	☐	■	☐	☐

OTHER COMMENTS

SUMMARY

SERVICES - PERSONAL SERVICES

1. Summary

Personal services include laundry services, photographic studios, beauty and barber shops, shoe repair, and funeral services. There is little metric activity in the personal services industry. With the exception of photographic studios, no metric activity is expected in the near future.

2. Industry Covered

Personal Services (SIC Major Group 72) covered in this report include laundry, cleaning and garment services; photographic studios, portrait; beauty shops; barber shops; shoe repair shops, shoe shine parlors, and hat cleaning shops; and funeral services and crematories.

3. Current Status

With the exception of photographic studios, there is no metric activity in the personal service industry. Nor has there been any in the past. Most of the associations contacted felt that their members do not deal with measurement sensitive activities, so discussions of conversion have not surfaced. Photographic studios use some metric products (film and lenses), however, the services they render (i.e., distance of the object from the camera) do not involve metric measurement. The industry has not discussed metricating their practices.

4. Prospects for Conversion

Conversion is not anticipated within this industry. If metrication occurs, it will emerge outside these service businesses and be forced upon them.

5. Sources

While no associations contacted are actively monitoring the status of metrication within their industry, the most knowledgeable associations for general information include: The National Funeral Directors Association for information on funeral and crematory services; the Associated Master Barbers and Beauticians of America for barber and beauty shops; and the Professional Photographers of America, Inc.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: BUSINESS SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	■

OTHER Planning took place in the 1970's -- very little today. The only hard metric is for scientific applications, e.g. R&D and other laboratories.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

The momentum of conversion varies across sectors. For most, it is non-existent. There is some change within data processing and related services tied to metrication of supplies and equipment. R&D laboratories are predominantly metric, therefore there is no momentum for conversion expected for the future.

SUMMARY

SERVICES - BUSINESS SERVICES

1. Summary

Business services covers establishments rendering services to businesses on a fee or contract basis. It includes advertising, collection, and mailing services; management and maintenance services; news syndicates; data processing; and miscellaneous services, e.g. research and development services and photo finishing services. With the exception of R&D activities, data processing, and photo finishing services, there are no metric activities within business services. Research and development laboratories are predominantly metric and have been for years. Within the photo finishing and data processing industries, there were discussions of converting in the past and there is some use of metric products today. With the exception of data processing, there are no increases in metric activity expected for any of these sectors over the next few years.

2. Industry Covered

Business services (SIC Major Group 73) includes: advertising, collection, and mailing services; management and maintenance services; news syndicate services; data processing, and miscellaneous services. Within miscellaneous services, for-profit research and development laboratories and photo finishing laboratories were covered.

3. Current Status

Advertising: There are no metric activities on the industry level. However, some agencies have clients that have promoted metric advertising--namely informative or corporate advertising for internal, educational purposes. Little activity is occurring at this time. The newspaper industry is standardizing advertising space. However, these activities do not include metric sizes.

Collection: There are no metric activities in collection. The industry deals with money, not measurement, therefore, is not involved in discussions of metric or metrication.

Mailing: There are no metric activities in mailing services. Mail sizing and other requirements conform to U.S. Postal Service regulations. The industry does not foresee any planning or metric discussions taking place unless precipitated by a change in U.S. Postal Service policies or regulations.

Maintenance and Personnel/Management: Sources contacted in these areas said that there are no metric activities, past or present, within the services provided by maintenance, personnel, or management services firms. No discussions have occurred at the association levels.

News Syndicates: There are no metric activities, past or present, occurring within news syndicate services.

Data Processing: There is some use of metric in providing data processing services. The use stems from supplies and equipment — cards, tapes, and computers being increasingly metric. Use of metric is not extensive today, but is growing steadily. The industry does not have a metric policy, but is prepared to provide services as needed.

Research and Development Laboratories: According to association sources, R&D laboratories are predominantly metric. One source estimates that 90-95% of chemical R&D laboratories are hard metric in their supplies, operations, equipment, etc. The high level of metric use in this sector is characteristic of other scientific and technical sectors.

Photo Finishing Laboratories: There is little metric activity in photo finishing services. There was discussion about conversion throughout the 1970's, and some educational services were provided by associations in the form of literature and conversion cards. No activity has occurred in years. There is a high degree of metric penetration of products and supplies used in these laboratories — namely hard metric film and dual labeled supplies.

4. Prospects for Conversion

Few increases in metric activities are expected in the business service industry. Those sectors with high metric use, e.g., R&D laboratories, will continue at the same levels. Most business services are in a wait and see mode. If the customer demands metric, if the products they use convert, or if outside policies/regulations change, they will respond. Data processing services, for example, are expected to continue their gradual use of metric as the supplies and equipment they use change to metric.

5. Sources

The following sources are recommended due to their knowledge of the industry and monitoring of metric activity. For advertising - the American Association of Advertising Agencies; for collection activities, the American Collectors Association; for direct mailing and related services, the Mail Advertising Service Association International; for data processing and related services, the Association of Data Processing Service Organizations; for research and development laboratories, the Industrial Research Institute; and for photography laboratories, the Association of Professional Color Laboratories.

6. Additional Notes Provided by ANMC

There is increasing interest in issues associated with metric changeover of data processing software. ANMC's Data Processing Office Equipment (DP/OE) Sector Committee has under development Guidelines for Metric Transition of Software. Previous investigation and inquiry by ANMC's Aerospace Sector Committee suggested there was much more involved in this issue than conversion tables. As more and more companies begin to design and manufacture metric-dimensioned products, a need will develop for handling both measurement systems and eventually planning for complete metric changeover. The ANMC Data Processing/Office Equipment Sector Committee Guidelines have undergone several reviews; to obtain more input, ANMC is considering sponsorship of a symposium for all affected interests to come together to better define industry issues, user requirements, and customer needs.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: AUTOMOBILE REPAIR

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER ____________________

____

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Prom activ
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	☐

OTHER COMMENTS

SUMMARY

SERVICE - AUTOMOTIVE REPAIR, SERVICES AND GARAGES

1. Summary

The auto repair industry, including rental leasing of cars, and parking services, is increasingly dealing with metric as automobiles are converted to metric. This metrication process will continue, tied to conversion of the automobile industry.

2. Industry Covered

Automotive repair, services, and garages (SIC Major Group 75), includes establishments engaged in furnishing automotive repair, rental, leasing and parking services.

3. Current Status

Some auto repair shops are in the process of metricating. Manufacturers of service tools and equipment feel that conversion had a severe impact at the service/retail level. Sources reported that mechanics had to buy thousands of dollars worth of tools. Dual measurements will have to be provided for at least another five years. All new equipment is hard metric. But some older machinery, such as diagnostic equipment, read in inches and pounds. Generally, manufacturers rather than associations provide metric information to repair shops at the time of conversion.

4. Prospects for Conversion

Conversion will continue at the repair level as it progresses at the manufacturing level.

5. Sources

The Equipment & Tool Institute is a good source of metric conversion information for the automotive service industry.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: MOTION PICTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

				CONVERSION	
	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☐	■	■	■	■

OTHER This activity is mostly related to products.

Almost no activity is taking place with the services.

	None	Pro	Anti
FORMAL METRIC POLICY?	■	☐	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote, active
INDUSTRY VIEW ON METRIC	■	☐	☐	☐	☐	■

OTHER COMMENTS

Metric activities in the motion picture industry should be discussed in two contexts: equipment/materials and services. The equipment/materials have included hard metric for over a decade; the services, however, are almost exclusively customary. There is little or no momentum in the services to metric today or in the near future.

SUMMARY

SERVICES - MOTION PICTURE SERVICES

1. Summary

The Motion Picture Service Industry includes production and distribution of motion pictures, allied services, and theaters. The industry is a metric hybrid. Most of the equipment and materials used to produce and develop motion pictures are hard metric. The services related to motion pictures and the manner in which the equipment is used is strictly customary. Services are gradually moving toward metric, but the transition is very slow, and will, at best, come with the next generation of cameramen, cinematographers, etc.

2. Industry Covered

The Motion Picture Service Industry (SIC Major Group 78) includes: motion picture production and allied services; motion picture distribution and allied services; and motion picture theaters.

3. Current Status

Equipment and Materials: While there is no coordinated movement within the industry to convert to metric, some equipment and materials have been metric for many years. The motion picture industry uses metric film and lenses, e.g., 8, 16, and 35 mm. film and lenses. While film width is measured in millimeter, measurements of length still use feet. There is no sign that this practice will change in the near future.

Video tape width is in inches and length is measured in minutes. The chemicals used in developing are packaged in hard metric. The containers holding the reels of motion picture film are hard metric; those holding video tape are customary.

Services: While persons involved in the motion picture industry are aware of the metric sizes (widths) of the film and lenses, the services connected with producing and distributing motion pictures almost exclusively use customary. An example of how measurement is used includes focal lengths -- distances from the camera to the subject being filmed. These are measured in inches/feet.

Standards: There is a movement within the motion picture and film industries to standardize motion picture film/equipment. Most specifications for film and lenses are already in metric. There are some customary standards, but the metric equivalents are always listed. A few of the resources used by the industry in setting its standards are:

- The American Standards Institute--for conversion standards. ASI B-48.1-1933, revised 1947: American Standardization Procedures for Inch-Millimeter Conversion for Industrial Use.

- The International Standards Organization (ISO) R-1000-1969: Recommended rules for the use of metric units.
- The ANSI Standard B-4.3-1978: General Tolerances for Metric Dimension Products, and ANSI Z-210.1-1976: Metric Practice.
- The ISO/IEC Standards.
- IEEE 268-1973: Recommended Practices for Units in Published Scientific and Technical Work.
- ANSI Style Manual for Proposed Metric Practices.

These standards cover equipment and film--they do not cover services. The move toward internationalization and standardization in the industry does not include suggestions to metricate the services and practices of the motion picture industry.

4. Prospects for Conversion

Metrication and standardization within the materials and equipment segment of the motion picture industry is expected to continue--largely due to the influence of international organizations and foreign manufacturers of the materials and equipment.

The industry is divided as to the prospects for conversion of the services associated with making and distributing motion pictures. This disagreement ranges from no change from present practices to a gradual transition. Those that foresee the slow metrication see it appearing through education of the next generation(s). The consensus among those persons contacted is that the present cameramen, cinematographers, producers, directors, actors, etc., will resist any changes to the status quo.

5. Sources

For information on film and material standards the Society of Motion Picture and Television Engineers is an excellent source of information For information on the way motion pictures are made and distributed (services), the Academy of Motion Picture Arts and Science is a good source.

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DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: AMUSEMENTS AND RECREATION SERVICES, EXCEPT MOTION PICTURES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	☐	■

OTHER ____________________

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	■

OTHER COMMENTS

Activity within coin-operated amusement devices will continue at very high levels. Activities in sports and recreation, however, are declining from their previous high levels of metrication.

SUMMARY

SERVICES - AMUSEMENTS AND RECREATION SERVICES EXCEPT MOTION PICTURES

1. Summary

This industry includes establishments engaged in providing amusement or entertainment on payment of a fee or admission charge. U.S. athletic events use metric measurements in some swim meets and track and field events. This is especially true where the athletes are likely to be training for international competition. Where there is no involvement in international events, interest in metric is decreasing in the U.S. The National Collegiate Athletic Association (NCAA) is no longer attempting to convert. The Olympic events are measured entirely in metric. Another recreation area, coin operated amusement devices, is showing a definite trend toward conversion. This trend is driven by the introduction of metric video games in this country. What has evolved, is that manufacturers who produce the video games also produce other coin operated devices such as pool tables, music machines, etc. Although those machines are still mostly customary, the manufacturers are steadily introducing metric parts into them, in order to simplify their operations. This metrication will continue in the future.

2. Industry Covered

Amusement and Recreation Services (except Motion Pictures), (SIC Major Group 79) includes establishments engaged in providing amusement or entertainment on payment of a fee or admission charge, including dancehalls, theaters, bowling alleys, and sports activities.

3. Current Status

Metric activity is evident in the sports field. It is used exclusively in the Olympic games. In U.S. sports, it has been used in swim meets and track and field events, but in no other U.S. sports. It is particularly important to athletes involved in international competition. The NCAA uses metric measurements for championship events. However, they no longer (as of 1983) require it for other events. Though they are not now emphasizing metric, other sports associations feel metric will become more prevalent.

Video games which were developed in Japan are completely hard metric and are being manufactured that way in the U.S. Other types of coin-operated games such as music machines and pinball machines are made by the same manufacturers. A lot of the parts for these machines are obtained from Europe and a lot of these machines are exported. For all these reasons, there is a definite transition to metric in this industry.

4. Prospects for Conversion

Coin operated amusement devices are undergoing a rapid metrication. The major factor driving this conversion is that manufacturers of video games (completed hard metric) are also the makers of other types of coin operated games. In the sports field, opinion is divided. Some associations feel metric will become more prevalent but the National Collegiate Athletic Association is no longer pushing conversion. The fact that metrication would require new tracks (due to lap length) and swimming pools (pool lengths) also deters conversion. Metrication may continue but at a slow pace.

5. Sources

The National Collegiate Athletic Association, as a rulemaking organization, is a primary source of information on the use of metric measurements in athletics. The Amusement and Music Operators Association is the primary source of information on coin operated amusement devices.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: HEALTH

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	■

OTHER Education

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	■	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promote active
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	■	■

OTHER COMMENTS

Metric activity is high because of use by the medical profession. Momentum for complete conversion remains at medium because of the perceived difficulty of interpreting metric to patients and the cost of converting hospital construction, and equipment.

SUMMARY

SERVICES - HEALTH SERVICES

1. Summary

Health services include establishments primarily engaged in furnishing medical, surgical, and other health services to persons. Metric use is relatively advanced in health services which have made progress towards an international standard of measurement, using SI units. The pathology laboratories and pharmacies measure in metric and drugs are sold in hard metric quantities. A patient's weight, height and temperature are generally measured in pound, inch and Farenheit degree. Several hospitals have studied the possibility of further conversion (height, weight and temperature, metric sizing in beds, rooms) and some have carried out changes. Aggressive conversions of entire hospital systems are not expected. Piecemeal adaptations will continue.

2. Industry Coverage

Health and Medical Services (SIC Major Group 80) includes the office practices of doctors, dentists and other related health practitioners; hospitals, nursing services, medical and dental laboratories and outpatient care are also included.

3. Current Status

- Doctors are debating whether or not to adopt the use of three SI units, the milli pascal, mole and the joule. Most medical practitioners use metric measurement routinely. However, they saw no immediate benefit to patients in adopting these units. The medical journals have adopted SI units tentatively, at least to the extent of including them in parentheses.
- Drugs, hospital supplies are manufactured im metric units, frequently dual labeled in packaging.
- When a hospital's association informed its members of recent metric conversion guidelines published for Canadian hospitals, 300 U.S. hospitals asked for a copy.
- Publications for diabetics are in customary, but include metric conversion tables.
- Private trade schools preparing medical assistants (ancillary health professionals) teach both metric and customary units.

Industry-Wide Activity

A hospital supply manufacturer claims that producing in metric involved extra processes internally. Raw materials arrive in customary units, paper work conversions are made to handle billing, the materials are manufactured in metric, packaged and labeled in dual form and shipped out in customary units. If the products were being shipped overseas, another conversion was made at the port loading dock.

Hospital engineers report that some conversions are being requested by medical staff, but long lifetimes of some hospital plant and equipment limits changes to metric.

The nursing staffs' claim nurses are already familiar with metric units and use whatever is required. Some areas, such as pediatrics, dialysis, X-ray, use metric units for weight, height and temperature.

Standards

In the area of manufacturing products and supplies for health and medical services, the standards writing organizations are the Association for Advancement of Medical Instrumentation, the National Committee for Chemical Laboratory Standards and ASTM. Standards are either hard or customary with metric equivalents, depending on the item.

4. Prospects for Conversion

Members of the medical and health professions desire uniform standards in order to avoid error and misunderstanding. However, they are reluctant to change when they see no immediate benefit to themselves or their patients. Patients are frequently cited as a barrier to change - it is feared patients will not understand dosages, temperature, or their weight expressed in metric. Sources dealing with diabetics believed more use of the metric system would not cause hardship to diabetics. Further conversion may occur in a non-uniform way, promoted by hospital and medical associations who are mildly in favor of more conversion.

5. Sources

Two pathology organizations, the American Society of Clinical Pathology and the College of American Pathology, have a continuing interest in international standardization. The American Hospitals Association and the American Medical Association can provide an overview of the health service field. The Health Industry Manufacturers Association is aware of changes in manufacture and labeling of health-related products. The American Diabetes Association maintains an up-to-date educational program which includes information on metric.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: LEGAL AND SOCIAL SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY	■				
	SI MARKET PENETRATION	■				
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS	■				
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS	■				
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)	Planning ☐	Standards ☐	Labelling ☐	Hybrid ☐	Hard ☐

OTHER NONE.

FORMAL METRIC POLICY?	None ■	Pro ☐	Anti ☐			
INDUSTRY VIEW ON METRIC	Divided ☐	Resist/ active ☐	Only if necessary ■	Wait & see ☐	Willing if market wants ☐	Promo activ ☐

OTHER COMMENTS

SUMMARY

SERVICES - LEGAL AND SOCIAL SERVICES

1. Summary

Legal services, which includes establishments offering legal advice or services, designed a Uniform Metric System Procedures Act which was promulgated to the states in 1979 and set up a system for correcting state statutes and regulations for weights and measures which possessed statutory but unintended barriers or impediments to metrication. It has not been adopted by any states. Association representatives claim lack of adoption is due to reduced Federal government interest in metrication and because conversion has not been common in U.S. industry. Future use of this act and involvement of the legal profession depends on further conversion in industry. Social services includes establishments providing social and rehabilitation services. There is no reference to metric systems in this profession. Conversion is not expected to occur within social services.

2. Industries Covered

This summary covers legal services (SIC Major Group 81) and social services (SIC Major Group 83). Legal services includes attorneys, counselors-at-law, law officers, lawyers, legal aid services, legal services, patent solicitors offices, referees in bankruptcy. Social services includes individual and family social services, job training and vocational rehabilitation services, child care services, residential care and other related services.

3. Current Status

Legal Services: The legal profession is involved in metric insofar as a metric product is specified in disputes, contracts, etc. The Uniform Metric System Procedures Act which was designed and promulgated in 1979 in response to government leadership, set up a method of reviewing state statutes and regulations for weights and measures which could be converted. However, the Act has not been adopted by any states.

Social Services: The social services profession has no reference to metric systems now. If the whole country converted they would use it in recordkeeping, measurement of meals and other product services.

4. Prospects for Conversion

Legal services and social services depend on the rest of U.S. industry in their use of metric systems. Barring a significant national conversion, they are not expected to metricate their services.

5. Sources

The American Bar Association is the largest and most influential legal organization in the U.S. and is a good source of general information. The National Conference of Commissioners on Uniform State Laws, is a primary source on the status of metric conversion in the law. The National Association of Social Workers is a large, all-encompassing organization that would be aware of any use of metric in the social services.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: EDUCATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
	SI MARKET PENETRATION			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■	■		
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Labelling	Hybrid	Hard
■	■	☐	■	■

OTHER Teaching, Training

FORMAL METRIC POLICY?

None	Pro	Anti
☐	■	☐

INDUSTRY VIEW ON METRIC

Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promo activ
☐	☐	☐	☐	■	■

OTHER COMMENTS

Early enthusiasm subsided, current activity patchy

SUMMARY

SERVICES - EDUCATION

1. Summary

Educational services include establishments furnishing formal academic or technical courses, schools, and libraries. The U.S. educational system was deeply involved with promoting metric in education until about the end of 1981, when many activities ended and interest leveled off. Metric education in elementary, junior and high schools is now institutionalized in patchwork fashion across the country. Textbooks by major publishers have been revised to include metric only or metric and customary units. Progress in metric engineering education has been uneven depending on the field of engineering and the school. Vocational education has expanded to include both metric and customary units in areas where industrial conversions have occurred, i.e. automotive repair and allied health occupations. Pressure from industry, government, the professions will be necessary for further conversion to occur. At this time, continued low levels of metrication activity are expected for the future.

2. Industry Coverage

Educational services (SIC Major Group 82) includes almost all forms of education, public and private, at local, state, and Federal levels.

3. Current Status

- Several states require statewide mathematics tests, and sometimes graduation competency tests to be given in metric units.
- Certifying examinations written by the National Council of Engineering Examiners, may be worked in either metric or customary units.
- Private trade and technical schools teach in both metric and customary units for students in allied health occupations.
- A major textbook publisher has converted all math, science, social studies, home economics, and driver education texts to metric listing customary equivalents.

- The National Council of Mathematics Teachers, sponsors of National Metric Week, held every October, have received 30-40 requests for materials on this year's event.

Elementary and secondary education:

During the late 1970's almost all states responded enthusiastically to national calls for more metric education. Some states followed through on this early enthusiasm, e.g. Maryland, Illinois, New York, California, and Florida. Even in these states, however, development of metric curricula has been uneven.

One school system's activity:

Montgomery County, Maryland, institutionalized metric education in its school system by a program of community involvement, teacher training, and curriculum revision. The driving force was a requirement that all of the state's math tests be answered in metric units. Math, science, social studies, home economics, reading, and language arts curricula were revised to include metric units. The system is attempting to convert athletic fields and vocational education equipment - yet this change is progressing more slowly.

Engineering education:

A nationwide plan formalizing a conversion already in progress should be ready by June 1984. Three major outstanding issues are:

- Publication of textbooks using hard metric. At present the majority of books use dual measurement frequently with metric equivalents.

- Replacement of laboratory and other equipment with hard metric equipment.

- Teaching engineering courses in metric only.
  At present the use of SI in engineering education is uneven. Automotive, electrical, electronics engineering students are more likely to be taught in metric and to use metric in later jobs. Professors of civil, mechanical, chemical, agricultural and industrial engineering teach both systems. Students typically use only customary units in their work.

Standards:

Standards writing organizations in education include local and state curriculum committees, statewide examinations and national and regional examination writing organizations. Use of metric varies across states and localities.

4. Prospects for Conversion

Many of the pro-metric groups within educational associations are no longer active, engineering being a major exception. Some sources claim that they see no reason for further changes beyond those already made.

Factors promoting conversion:

- Within engineering education, active promotion of metric changeover continues but at lower levels than in the 1970's.
- Students have responded positively to the use of metric.
- Certain occupations require familiarity with metric units.
- Math and science test problems are given in metric units in some states.
- Textbooks containing both units of measure are readily available. Texts in metric only are frequently available if specifically requested from publishers.
- Some educational organizations continue to promote metric education, through events and literature.

Factors inhibiting conversion:

- Costs of replacing equipment.
- Decreasing enthusiasm for metric education on the part of school systems and individual teachers.
- Lack of pressure from industry and government.
- In engineering, specific areas of industry are not converting.

Without further pressure from society, industry or the government, conversion to metric education will continue to be uneven and patchy in its progress. Metric education for engineers will not become fully institutionalized until all areas of industry use metric as a primary method of measurement.

5. Sources

The metric coordinating committee of the American Society for Engineering Education can provide useful information on progress in engineering education. The National Council of Mathematics Teachers has an on-going interest in and knowledge of metric education. Most textbook publishers can supply information on metric texts for elementary, high school, and college courses.

DIAGNOSIS OF METRIC SITUATION

DIVISION: SERVICES

MAJOR GROUP: MUSEUMS, ART GALLERIES, BOTANICAL AND ZOOLOGICAL GARDENS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY				■	
	SI MARKET PENETRATION				■	
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS				■	
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS				■	
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Labelling	Hybrid	Hard
TYPE OF METRIC ACTIVITY (IF ANY)	☒	☐	☒	☒	☒

OTHER Education

	None	Pro	Anti
FORMAL METRIC POLICY?	☐	☒	☐

	Divided	Resist/ active	Only if necessary	Wait & see	Willing if market wants	Promot activ
INDUSTRY VIEW ON METRIC	☐	☐	☐	☐	☐	☒

OTHER COMMENTS

SUMMARY

SERVICES - MUSEUMS, ART GALLERIES, BOTANICAL AND ZOOLOGICAL GARDENS

1. Summary

This category of services involves the non-commercial operation of museums, art galleries, and gardens. Hard metric is frequently used in measuring paintings and labeling museum exhibits. Dual labeling is frequently used in both the literature and labeling of exhibits at museums, zoological parks and aquariums. Use of metric is expected to increase in the near future.

2. Industry Covered

Art Galleries, Botanical and Zoological Gardens (SIC Major Group 84) includes organizations that are not operated commercially, and are of educational, historical or cultural interest.

3. Current Status

The Smithsonian Institution has been very active in promoting metric and have: established a metric committee; introduced metric in publications, exhibition labels and signage; formed task forces; conducted surveys; instituted internal training workshops and conducted an awareness campaign for employees. Zoological parks, aquariums and museums are introducing metric labeling of exhibits as they update systems. Art dealers have traditionally dealt in both metric and customary measurement systems, because of the international scope of their business.

4. Prospects for Conversion

The Smithsonian is continuing their active role in promoting the use of metric. Conversion is likely to continue in other art institutions due to their large influence in the industry and due to the international nature of the trade. Zoological parks and aquarium sources foresee a continued, gradual dual labeling of literature and exhibits as systems are updated.

5. Sources

The Smithsonian Institution has a metric coordinator and a formal pro-metric policy. They are a primary source of information on metrication within museums. The American Association of Zoological Parks & Aquariums is knowledgeable about their member institutions' metric activities and the Art Dealers Association of America is well informed about the use of metric in that industry.

AMERICAN NATIONAL METRIC COUNCIL

PERSPECTIVE

This appendix contains excerpts from an ANMC study etitled "A Perspective on U.S. Metric Transition Status." This study was prepared for Metric Conversion Canada and was carried out in November/December 1983.

Analysis and Conclusions

Change is a traumatic experience. Any change to the workplace or the make-up of a familiar system such as measuring units often is considered a threat to existing norms-a threat to a way of life, to job security, to status. In approaching metric transition in the U.S., overcoming fear of and resistance to change as a traumatic event is a key factor. It often acts as a constraint to metric transition progress.

Change can be feared by a corporate entity as much as by an individual. Fear or trauma is the most common response to the idea of change. This is an especially important factor with a proposed change that would be as wide-ranging as overall adoption of metric units, which would affect daily life of consumers and industrialists alike.

The United States is irrevocably launched on a program of transition to the metric system. While the process is unquestioningly ongoing, it is by no means all pervasive and its effects on various industries are not uniform. The Metric Conversion Act of 1975, which establishes the U.S. transition process as voluntary, creates an environment of uncertainty which leads to fragmented action by the private sector.

The private sector has four areas it feels need close attention. These include: relief from legal and regulatory barriers, legislation favoring metric transition, public awareness and education programs, and a complete data base on metric status. ANMC is devoting a majority of its resources to these areas.

Industry Planning & Publications Activity

Organized industry planning and coordination and the variety of available publications are also special indicators of metric transition status in the U.S.

A structure is in place under the auspices of ANMC that allows for all parts of the U.S. economy to meet, coordinate, and plan for the use of metric measurements. The structure, shown on page A-167, provides for industry sector committees in more than 50 segments of the economy, advisory groups in eight special interest areas, task groups in two cross-cutting arenas, and several coordinating bodies to examine metric issues and develop planning papers that serve as guidelines for industry and company metric decisions.

The activity (if any activity at all) varies from industry to industry. The current status of activity within the organized ANMC planning structure, shown on pages A-168 and A-169, indicates more than 20 industries with over 2,000 volunteers actively involved in metric planning.

Areas that have been most active in 1983 include:

(1) The Forestry Sector Committee, which has developed a units guide and an industry plan.

(2) The Aerospace Sector Committee, which is working on a human factors study and consensus on an industry plan.

(3) The Construction and Agricultural Equipment Sector Committee, which is sponsoring a fastener symposium in March 1984.

(4) The Machinery Sector Committee, which has finalized a changeover guide.

(5) The Data Processing and Office Equipment Sector Committee, which is finalizing a changeover guide and has under development guidelines to software metric transition.

(6) The Water Resources Sector Committee, which has started work on a units guide.

(7) The Food and Crovery Products Coordinating Group, which has developed packaging guidelines.

(8) The Education and Training Coordinating Group, which has updated a metric product suppliers listing.

(9) The Medical and Health Coordinationg Group, which is working on a units guide together with organizational planning meetings in Professional Journals, Laboratory Medicine, and Medicine.

(10) The Metric Practice Advisory Group, which has finalized a Bibliography of Metric Practice Guides and a new edition of the Metric Editorial Guide.

(11) The Goverment Liaison Group which is working with the National Conference on Weights and Measures on metric-only labeling issues.

(12) The Tariff Task Group, which has finalized the Standard Reference Tables for Metric Conversion of Transportation Tariffs.

(13) The Standards Task Group, which is working on Chemicals and Machinery priority projects through a Sample Planning Chapter.

More than 55 planning documents have been developed within this organized planning structure. And, outside this planning structure more than 50 additional metric practice guides exist. A multitude of other metric publications exist from a variety of sources and total in the tens of thousands; ANMC alone maintains an information library with more than 10,000 pieces of materials.

Industries are choosing one of three different levels of metric planning. The level of planning undertaken often indicates the level of commitment to metric transition activity within that particular industry.

The first level of metric planning is reactive. This comes about when an external event spurs the need for industry to consider metric transition and planning is undertaken to facilitate the process, which has already begun. An example of reactive planning was the development of the ANMC-endorsed Retail Motor Fuel Dispenser Conversion Plan, which resulted from the rise of the cost of gasoline to more than $1/gallon and the inability of pump computing devices to deal with this, except through liter sales.

The second level of metric planning is active/aggressive. This comes about when an industry understands benefits can be obtained if metric transition is implemented. In this case, the industry which is planning develops a target date for action. An example of active/aggressive planning was the development of the ANMC-endorsed Chemicals and Allied Products Sector Conversion Plan which identified the needs and benefits associated with metric use and encouraged industry action.

The third level of metric planning is active/passive. This comes about when an industry understands that metric use is inevitable but believes it must be totally dictated by market demand and must take place only on a company-by-company basis. Generalized guidelines are prepared but target dates for action are eliminated. An example of active/passive planning is the ANMC-endorsed Instrument Sector Conversion Plan.

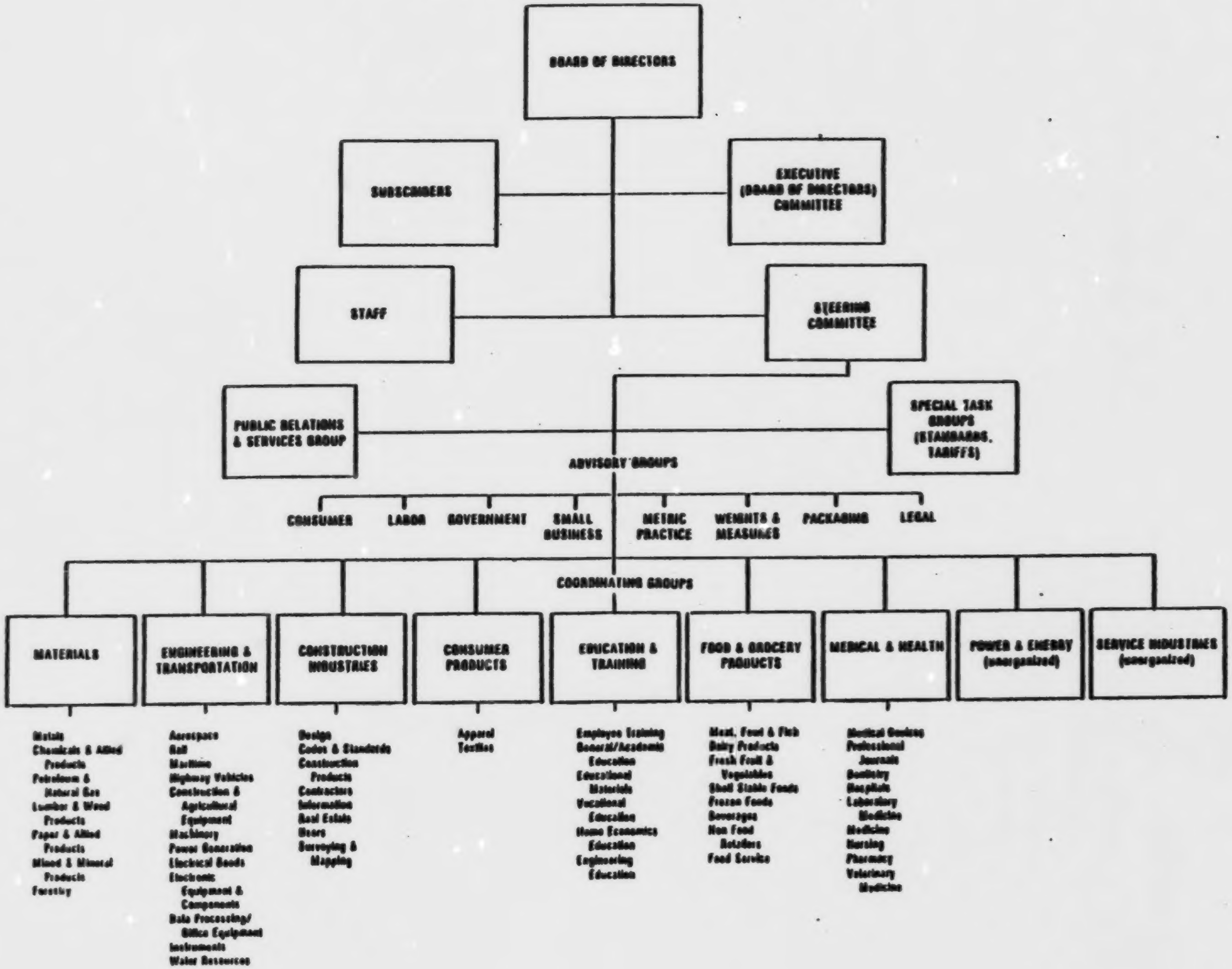
In addition, during the development of metric planning documents industries utilize several levels of coordination. First, there is an intra-sector review process, where all other involved and affected industries are provided the opportunity to have input. Third, there is a special-interests review process, where key elements of the economy (consumers, labor, small business, education, government) are asked for input.

All these planning and coordination levels come together through the ANMC planning structure. The theory is that all involved segments of the economy can have a part in the voluntary metric transition process.

This sophisticated planning structure exists as a means of achieving private sector consensus on all plans and publications related to U.S. metric transition. The success of this planning structure and publications program can be judged by the growth and increase in this activity in more than 50 industries spanning more than 10 years of time.

AMERICAN NATIONAL METRIC COUNCIL

ORGANIZATION CHART


BOARD OF DIRECTORS
SUBSCRIBERS
EXECUTIVE (BOARD OF DIRECTORS) COMMITTEE
STAFF
STEERING COMMITTEE
PUBLIC RELATIONS & SERVICES GROUP
SPECIAL TASK GROUPS (STANDARDS, TARIFFS)
ADVISORY GROUPS
CONSUMER
LABOR
GOVERNMENT
SMALL BUSINESS
METRIC PRACTICE
WEIGHTS & MEASURES
PACKAGING
LEGAL
COORDINATING GROUPS
MATERIALS
Metals
Chemicals & Allied Products
Petroleum & Natural Gas
Lumber & Wood Products
Paper & Allied Products
Mined & Mineral Products
Forestry
ENGINEERING & TRANSPORTATION
Aerospace
Rail
Maritime
Highway Vehicles
Construction & Agricultural Equipment
Machinery
Power Generation
Electrical Goods
Electronic Equipment & Components
Data Processing/Office Equipment
Instruments
Water Resources
CONSTRUCTION INDUSTRIES
Design
Codes & Standards
Construction Products
Contractors
Information
Real Estate
Users
Surveying & Mapping
CONSUMER PRODUCTS
Apparel
Textiles
EDUCATION & TRAINING
Employee Training
General/Academic Education
Educational Materials
Vocational Education
Home Economics Education
Engineering Education
FOOD & GROCERY PRODUCTS
Meat, Fowl & Fish
Dairy Products
Fresh Fruit & Vegetables
Shelf Stable Foods
Frozen Foods
Beverages
Non Food Retailers
Food Service
MEDICAL & HEALTH
Medical Devices
Professional Journals
Dentistry
Hospitals
Laboratory Medicine
Medicine
Nursing
Pharmacy
Veterinary Medicine
POWER & ENERGY (unorganized)
SERVICE INDUSTRIES (unorganized)

ANMC Sector Committee and Group status update #10, 1983-09

Legend	Staff	Nature	
	1--Cheryl Cummins 2--Robert Petersen 3--Phillip Quick	I--Investigation C--Consensus	P--Planning *--Inactive

Editor's Note: Several documents listed in previous Status updates have been deleted for space considerations. New documents are in bold type. Contact the appropriate staff member for further details and past activities.

Groups, Sector Committees	Staff	Nature	Documents (●)/Comments (■)
1.00 Materials			
1.01 Metals (1974)	3	P	● *Status Report for Metric Conversion in the Metals Sector, Metals Sector Conversion Plan* ■ Held joint industry/DoD meeting to discuss DoD procurement practices, 1982-10
1.02 Chemicals & Allied Products (CAP) (1974)	3	C	● *Chemicals Going Metric, Chemicals Sector Conversion Plan* (endorsed by ANMC 1981, USMB 1982), *Suggested Metric Package Sizes for Industrial Chemicals, Preferred SI Units for the CAP Industries, Fair Packaging & Labeling Act Position Paper*, report on Symposium on "Shipping and Billing Titanium Dioxide in Metric Units," Summary of Metric Conversion Plan, 1983-02 ■ Met 1983-04. Revising *Suggested Metric Package Sizes* and *Preferred SI Units* brochures. Presented industry metric status report to Synthetic Organic Chemical Manufacturers Association. Planning industry survey on transition pace, early 1984 Subsectors: Units of Measure, Standards & Specs, Legislation, Process Equipment & Packaging, Information, Government Liaison, Membership
1.03 Petroleum & Natural Gas (1974)	3	P	● *Conversion Plan for Retail Motor Fuel Dispensers* (endorsed by ANMC 1980), *Sector Conversion Plan, Retail Motor Fuel Dispenser State Conversion Deadline Status*, API 2564 approved as units guide, AGA Conversion Guide available ■ *Sector Conversion Plan* and position paper on using "bar" as unit of pressure approved, API Metric Committee's *Metric Package Guidelines* paper expected for review and approval by end of 1983 Subsectors: Units, Standards
1.04 Lumber & Wood Products (1974)	3	*	● *Lumber and Wood Products Planning Package*
1.07 Forestry (1978)	3	I/P	● *Selected Metric Units in Forestry*, fourth draft ■ All subsector planning activities underway; first draft of transition plan expected by late 1983; Units Guide published in SAF *Journal of Forestry* (1983-02). Updated version of SAF *Forestry Handbook* to contain metric units table and other metric information by early 1984 Subsectors: Planning, Measurement Units, Scaling & Measurements, Inventory & Mapping Measurements, Forest Management Practices, Legislation, Public Awareness & Training, Urban Forestry
2.00 Engineering & Transportation (1974)			
2.01 Aerospace (1976)	3	P	● Sector Metrication Plan undergoing consensus procedure; mid-1983 edition of PMP/SLED Log (semi-annual) currently under review ■ Computer software and small business transition projects complete, others underway. Met 1983-04, discussed drafting and disseminating position paper on safety-related issues of adopting metric in aviation air and ground operations for possible submission to FAA; details, *MR*, 1983-08
2.04 Highway Vehicles (1974)	2	P	● *Sector Conversion Plan* ■ Medium and heavy duty truck subsector being organized; symposium on industry issues tentatively planned for late 1983
2.05 Construction & Agriculture Equipment (1975)	3	P	● *Sector Conversion Plan, Suggested Preferred Sizes and Compositions for Metric Steel, Suggested Preferred Sizes for Metric Fasteners*; updated Metric Transition Planning Summary to be available by early 1984 ■ Position paper on "Commonality of Tolerances Applied to Plate, Sheet, and Bar Steel" being drafted for circulation and comment in mid-1984
2.06 Machinery (1974)	2	P	● *Semiannual Status Report, Metric Changeover Guide for Machinery Manufacturers* ■ Met 1983-08 to review 1983 Activity Program for gathering information to execute tasks listed in *Changeover Guide*. Completed and will maintain listing of all measurement sensitive standards. In process of setting priorities for metric changes in 1 200 machinery-related government specifications and standards for procuring industrial equipment
2.07 Power Generation (1975)	3	P	● *Plan Summary, Sector Conversion Plan* ■ SI version of ASME Boiler and Pressure Vessel Code (1983-10) with metric units now available. Industry status reviewed in *MR*, 1983-02
2.08 Electrical Goods (1975)	3	P	● *Sector Conversion Plan Summary, Sector Conversion Plan, Preferred SI Units for Use in Electrical Science and Technology* ■ Work highlighted in *Electrical World* magazine (1980-10, available from ANMC). Plan Summary revision in progress for late 1983
2.10 Data Processing/Office Equipment (1981)	2	I	● Metric Changeover Guide for DP/OE, 1983-04. Metric Transition of Software in development ■ Met 1983-04 to approve *Changeover Guide* for consensus process and to discuss approaches to transition in software. Meeting 1983-10-04/05 to discuss metric transition guidelines and metric in computer graphics
2.11 Instruments	2	C	● *Metric Conversion Plan* (endorsed by ANMC 1981, USMB 1982)

2.13 Water Resources (1981)	2	I	● *Sector Committee Purposes and Objectives statement* ■ Status and work outlined in *MR*, 1983-08. Met 1983-04 to review and critique several water resources metric practice guides and discuss specific units for certain water measurements
3.00 Construction Industries (1974)	3	P	● Met 1983-04, reviewed industry status, voted to reorganize from eight to three sectors on residential, heavy industry, and commercial construction; details in *MR*, 1983-07
4.05 Textiles (1977)	1	*	● *Guide to Metrication for the Textile Industry*
5.00 Education & Training (1976)	1		■ Reviewing DP/OE Sector Committee Changeover Guide for educational needs and input. Project on transition progress in engineering handbooks being considered
5.01 Employee Training (1974	1	*	● *SI Metric Training Guide*
5.03 Educational Materials (1974)	1	*	● *Metric Guide for Educational Materials*
5.04 Vocational Education (1979)	1	P	● *Metric Planning Guide for Vocational Education*
5.06 Engineering Education (1973)	1	P	● *Expectation Dates for the Predominant Use of SI for Teaching Engineering Courses* ■ Developed first draft of Metric Transition Plan for refinement and comment in 1983 and 1984
6.00 Food & Grocery Products (1974)	2	P	● *Sector Committee Purpose and Policies*, statement on *Inconsistent Indication of Metric Equivalents*, *Suggested Metric Package Guidelines for Food and Grocery Products* ■ Met 1983-04, approved *Suggested Metric Package Guidelines* paper for general comment and review. Status discussed in *MR*, 1983-01
6.03 Fresh Fruit & Vegetables (1979)	2	I	● Report: Panel Presentation on Project: M.U.M. to Representatives of the U.S. Departments of Agriculture and Commerce (1983-03) ■ Met 1982-09 as division of UFFVA Utilization and Productivity Committee. Panel on Project: M.U.M., 1983-03. M.U.M. profiled, *MR*, 1983-01
7.00 Medical & Health (1980)	3		■ Plans to circulate draft document on proposed SI units in the medical and health industries to all Sector Committees for review by mid-1984 Industry metric status detailed in *MR*, 1983-07
7.02 Professional Journals (1982)	3	I	■ Discussing style guide for uniform metric usage in medical journals
7.05 Laboratory Medicine (1981)	3	I	■ Approved scope and objectives, adopted SI units recommended in NCCLS position paper on *Quantities and Units: SI*. Tentatively adopted 1987 as target date for switching to SI in reporting lab data. Will begin to prepare first draft of document for preferred SI units in medical and health industries for review and comment 1984-06
7.06 Medicine (1982)	3	I	■ Convened 1982-10-01; reviewing recommendations of Laboratory Medicine Sector Committee and AMA Council on Scientific Policy SI position. Reviewing results of AMA House of Delegates specialty societies poll on using SI. Accepted NCCLS position paper on *Quantities and Units: SI*, setting 1987 as target date for adopting proposed SI units industry-wide
Standards Task Group (1980)	1	I/P	● *Final Report and Recommendations*, sample *Sector Conversion Plan Chapter for Standards* ■ CAPS and Machinery Committees setting priorities for standards transition needs in their industries; progress reports available
Tariffs Task Group (1980)	1	C	● Standard Reference Tables for Metric Conversion of Transportation Tariffs, 1982-10 (second edition) ■ Standard Reference Tables endorsed by ANMC Steering Committee, 1982-10, issued special ICC Tariff Authority #82-10600 1982-10
Metric Practice Advisory Group	1	C	● *Metric Editorial Guide*, *Bibliography of Metric Practice Guides*, *recommended practices:* "Definitions of Hard & Soft Conversion," "Mass Density," "Mass Concentration" ■ Revising and updating *Metric Editorial Guide* and *Bibliography of Metric Practice Guides*; reviews industry guides and standards for correct metric practice
Consumer Advisory Group	1	I	● *Consumer Considerations for Sector Conversion Plans*, *Program Plan—Tasks, Goals and Objectives*, *Metrication and the Consumer, A Metric Reference for Consumers* ■ Reviewing and providing consumer input on *DP/OE Changeover Guide* and Food & Grocery Products C.G. packaging guidelines paper
Small Business Advisory Group	1	I	■ Reviewing and providing small business input on *DP/OE Changeover Guide*
Government Liaison Group	1	I	■ Monitors activities of ICMP, MOC, MOC Executive Board, DoD MSG, attends meetings to provide private sector input

Several Sector Committees that are currently inactive produced planning aids and educational materials available from ANMC. They include: 1.05, Paper and Allied Products; 1.06, Mined and Mineral Products; 2.02, Rail; 2.03, Maritime; 2.09, Electronics Equipment Components; 4.00 Consumer Products Coordinating Group; 4.02, Apparel; 6.01, Meat, Fowl and Fish; 6.02, Dairy Products; 6.04, Shelf Stable Foods; 6.05, Frozen Foods; 6.06, Beverages; 6.07, Non-Food; 6.08, Food Retailers; 6.09, Food Service. Contact ANMC for details on these committees.

American National Metric Council

Planning & Coordination

DOCUMENTS

Status Report for Metric Conversion in the Metals Sector
Metals Sector Conversion Plan
Chemicals Going Metric
Chemicals & Allied Products Sector Conversion Plan*
Suggested Metric Package Sizes for Industrial Chemicals
Preferred SI Units for the Chemicals Industry
FPLA Position Paper
Shipping and Billing TiO_2 in Metric Units
Summary of Chemicals Sector Metric Conversion Plan
Conversion Plan for Retail Motor Fuel Dispensers*
Retail Motor Fuel Dispenser State Conversion Deadline Status
Petroleum & Natural Gas Sector Conversion Plan
Lumber & Wood Products Metric Planning Package
Selected Metric Units in Forestry
Forestry Sector Conversion Plan
Aerospace Sector Conversion Plan
Aerospace Metric Standards (PMP/SLED) Log
Highway Vehicles Sector Conversion Plan
Construction & Agricultural Equipment Sector Metric Transition Summary
Construction & Agricultural Equipment Sector Conversion Plan
Suggested Preferred Sizes of Metric Steel
Suggested Preferred Sizes of Metric Fasteners
Metric Changeover Guide for Machinery Manufacturers
Power Generation Sector Conversion Plan
Power Generation Sector Plan Summary
Power Generation Sector Units Selection Guide
Electrical Goods Sector Conversion Plan
Electrical Goods Sector Plan Summary
Electrical Goods Sector Units Guide
Data Processing and Office Equipment Changeover Guide
Data Processing and Office Equipment Software Guide
Instrument Sector Conversion Plan*
Water Resources Sector Metric Units Guide
Construction Industries Plans & Schedules
    Design
    Codes & Standards
    Products
    Contractors
    Real Estate
    Surveying & Mapping
    Users/Owners
Guide to Metrication for the Textile Industry
SI Metric Training Guide
Metric Guide for Educational Materials

Metric Planning Guide for Vocational Materials
Engineering Education Expectation Dates
Engineering Education Sector Plan
Food & Grocery Products Statement on Inconsistent Indication of Metric Equivalents Food and Grocery Products Metric Packaging Guidelines
Report on Project: MUM (Modularization, Unitization, and Metrication)
Sample Sector Conversion Plan Chapter on Standards
Standard Reference Tables for Metric Conversion of Transportation Tariffs
Consumer Considerations for Sector Conversion Plans
Metrication and the Consumer
A Metric Reference for Consumers

American National Metric Council
Planning and Coordination

SELECTED BIBLIOGRAPHY OF METRIC PRACTICE GUIDES*

GENERAL

American National Standard Metric Practice, ANSI/EEE 268-82, 1982

Standard for Metric Practice, ASTM E380-82, 1982

ANMC Metric Editorial Guide, 3rd Edition, July 1981

Preferred Metric Units for General Use by the Federal Government, Federal Standard 376A, May 1983

Metric Units of Measure and Style Guide, USMA Publication #8, 12th Edition, Revised January 1979

Representations for U.S. Customary, SI, and Other Units to be Used with Limited Character Sets, ANSI X3.50, 1976

IEEE Standard Letter Symbols for Units of Measurement, IEEE/ANSI 260, 1978

MATERIALS

AISI Metric Practice Guide, American Iron & Steel Institute, 3rd Edition, 1978

X-94 Letter Symbols for Chemical Engineering with SI Conversion Tables, 1979

X-95 SI for AIChE - A Guide for the Implementation of the International System of Units by the Chemical Engineering Profession, 1979

Guidelines for the Use of the International System of Units (SI) in the Petroleum and Allied Industries, API Pub. # 2564, 2nd Edition, 1980

SPE Metric Standard, adopted by SPE Board, revised September 1982

Preferred SI (Metric) Units, CAGI Metric Card, May 1979

Metric Practice Guide for the Compressed Gas Industry, CGA P-11, 1980

Metric Units (SI) & Conversion Factors Pocket Guide, 1982

Metric Unit (SI) Application Guide, 1980

A Bridge to Metrication (proposal for metric multiwall bag packaging), 1980

ENGINEERING INDUSTRIES

Preferred Metric Units for Aerospace, NAS 10 001, Rev. 1, March 1978

NA Documents — Preparation and Maintenance in SI (Metric) Units, NAS 10 000, Rev.1, November 1977

Rules for Use of SI (Metric) Units, SAE J916c — Rev. June 1978, 1979 Handbook of J916c

Maritime Metric Practice Guide, DoD STD-1690, May 1979

Metric Units for Fluid Power Application, NFPA/T2.10. Im, March 1978

Metric Practice Guide for Welding Industry, AWS A1.1-80, 1980

Guidelines for Metric Data in Standards for Valves, Flanges, and Fittings, SP-86, 1977

AGMA Standard for Metric Usage, AGMA 600.01, March 1979

Use of Customary and SI (Metric) Units: ASAE Engineering Practice, ASAE EP 285.4, 1964, Rev. 1982

ASME Orientation & Guide for Use of SI Metric Units, ASME SI-1, 8th Edition, March 1978

ASHRAE Metric Guide for Heating, Refrigerating, Ventilation, and Air Conditioning, 3rd Edition, 1982

Systeme International d'Unites, Metric Measurement in Water Resources Engineering, February 1980

Units of Expression for Waste Water Management, Manual of Practice Number 6, 1983

Metric Guide for ANS Publications, 1976

A Guide to Conversion of Linear Dimension Measurements between U.S. Customary Units and Metric (SI) Units in EIA Standards, EP8, August 1975

American Society of Photogrammetry Usage of the International System of Units, adopted by the ASP Board of Direction, March 1978

CONSTRUCTION INDUSTRIES

Recommended Practice for the Use of Metric (SI) Units in Building Design and Construction, NBS Technical Note 938, June 1977

Standard Practice for the Use of Metric (SI) Units in Building Design and Construction, ASTM #E621-78, 1978

Metrication in Building Design, Production, and Construction, NBS Special Publication 530, September 1978

The Selection of Preferred Metric Values for Design and Construction, NBS Technical Note 990, December 1978

AIA Metric Building and Construction Guide, AIA, 1980

SI Units in Fire Protection Engineering, SFPE, March 1980

Metric Manual, U.S. Department of Interior, Bureau of Reclamation, 1978

CONSUMER PRODUCTS

Voluntary Metric Conversion for Consumer Sewing Threads, Hand Knitting, Crochet and Craft Yarns, 1978

A Voluntary Metrication Plan for Lengths & Weights of Industrial Threads, 1978

'We've Got Your Number!' (for Industrial Sewing Threads), 1978

Plan Ahead — Metrication and the U.S. Apparel Industry, Technical Advisory Committee AAMA, 1975

Home Sewing — Guidelines for Metrication, AHSA, 1979

Handbook for Metric Usage, 1977

SI Metric Practice Guide for the Appliance Industry, 1979

Going Metric with the U.S. Printing Industry, Graphic Arts Research Center, 1973

EDUCATION

Guidance for Using the Metric System — SI Version, STC-63-75, 4th Printing, June 1977

FOOD & GROCERY PRODUCTS

Living With Metrics — How to Feel at Home with the Metric System, 1978

What About Metric? A Consumer's Guide, Rev. 1976

MEDICAL AND HEALTH

The SI for the Health Professions, May 1971

Quantities and Units: SI NCCLS, pp C11-CR, 1979

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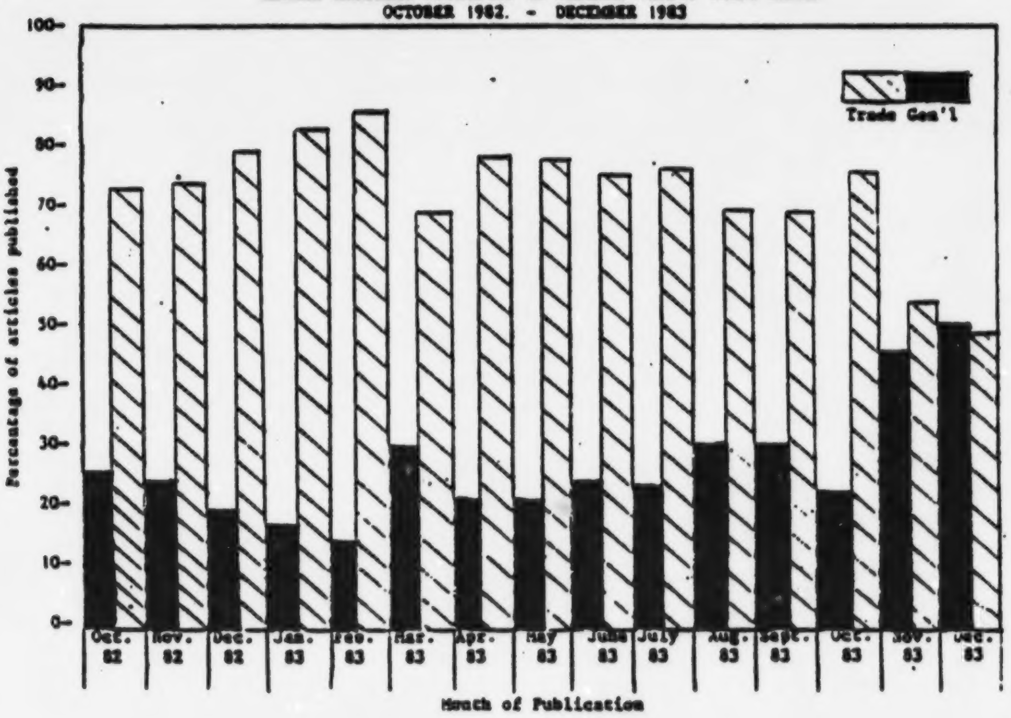
*abridged for this Report

METRIC ARTICLES PUBLISHED IN GENERAL VERSUS TRADE MEDIA
OCTOBER 1982. - DECEMBER 1983



Metric and the Press

Focusing on the articles from a perspective of whether they were published in general or trade publications provides some interesting perceptions on how the press and the general population view the issue of metric.

The overwhelming factor is the disproportionate percentage of trade articles versus general media articles. This variable clearly indicates that the interest in metric lies in the trade and professional publications rather than the general media. General media articles focus mainly on legislative activity and/or special private sector events, trade articles focus on day-to-day actions and activities.

Private - Public Partnership

The federal government at the request of the private sector is actively seeking the removal of barriers to the voluntary use of metric in business and industry. Several examples of actions taken in the last year include:

1. working on change to Congressional action that enacted a 102 inch truck trailer width limit when world regulations are mostly 2.6 meters (or 102.36 inches), so that the U.S. regulation will not constitute a trade barrier. A Federal Register notice has been issued on this subject to begin activity to change the 102 inch regulation.
2. working on changing U.S. Customs Bureau documents such as the Tariff Schedule of the United States (TSUS) that presently require product data to be reported in inch-pound units. The new Harmonized Commodity Description and Coding System now being developed uses the metric system; it should in the near future replace the TSUS, thus eliminating the barrier.
3. working on clarifying and providing guidelines on the Fair Packaging and Labeling Act regulations on metric use. Proper metric equivalent use is important, often construed as a barrier, and needs government clarification and support.

The National Conference on Weights and Measures (NCWM) at the request of the private sector is considering actions to insure the individual states allow metric-only labeling on non-consumer packages.

Under the Federal Fair Packaging and Labeling Act (FPLA), Public Law 89-755, and the Uniform Laws and Regulations of NCWM, consumer package labels must include a net quantity statement in inch-pound units of measure. Metric units may also be declared and may even appear first. Labeling in inch-pound units is not required under the FPLA for non-consumer packages and therefore metric-only statements are permitted.

Some weights and measures jurisdictions were incorrectly interpreting the FPLA and denying metric-only labeling on non-consumer packages. It was not known to what degree the existing laws and regulations of other state and local jurisdictions might similarly effect metric-only labeling. Therefore, NCWM agreed to assist ANMC by conducting a survey of all weights and measures jurisdictions to determine current practices in permitting metric-only labeling on non-consumer packages.

Such a survey was conducted by NCWM. It was apparent that a number of states misinterpreted the FPLA and the NCWM Uniform Laws and Regulations, and did not permit voluntary use of metric-only labels on non-consumer packages. The NCWM Laws and Regulation Committee recommended that the Conference reiterate that the states should permit metric-only labeling on non-consumer packages. This recommendation was approved by the full Conference. Activity continues within NCWM to seek additional ways to foster this activity.

Tariffs

The issue of tariffs and the transportation of products from point of production to point of sale/use affect all industrial segments of the U.S. economy. All elements of industry, including the shippers, the carriers, the government, must deal with transportation tariffs.

Traditionally, U.S. transportation has been the most heavily regulated of all industries at both the federal and state levels. The Interstate Commerce and Federal Maritime Commissions, the Departments of Justice and Transportation, and a myriad of state agencies, control virtually every aspect of the transportation environment, including but not limited to pricing, packaging, weighing, and measuring. Legally sanctioned prices and rules for their application are published in tariffs authorized by one or more of these agencies and changes can be made only after their approval.

This web of regulation was often enough to deter industry from even considering transition to the metric system. For carriers to convert in anticipation of their customers' actions would be expensive, inefficient, and counter-productive. Although some products were being packaged in kilograms, shipping documents and bills for services reflected pound equivalents because there had been no convenient, uniform means of converting applicable tariff provisions to metric units.

In November 1979, the ANMC Steering Committee voted to establish an Ad Hoc Tariff Task Group. They concluded that it would be beneficial to American industry to develop standards to promote uniform conversion practices. Such uniformity would result in substantial cost savings to shippers and carriers and prevent confusion brought about by differing conversion practices, which now exist. It would also assure compatibility with Canada, where tariff conversion, including rationalization of tariffs, had begun.

The purpose of the Tariff Task Group was to assist the sector committees of ANMC in identifying tariff-related issues associated with metric transition planning. The Task Group was to study the issue and recommend appropriate steps and mechanisms to assist in resolving the issues. Initial Tariff Task Group discussions identified as a major problem the inconsistencies and differences among conversion factors used in determining tariff rates.

In the fall of 1980, the Tariff Task Group undertook three different surveys to gather information on U.S. tariff needs and issues.

(1) Survey of Atlantic, Gulf, and Pacific Coast steamship conferences to determine current practices with regard to conversion factors. Results showed that conversion to metric-based tariffs was indeed a concern of the shipping industry, and that manifold conversion factors were currently being used.

(2) Survey of motor, rail, and water carriers (through their tariff bureaus and shipping conferences) to determine other problem areas in shipping metric materials. None of the responding motor carrier bureaus had a metric policy, but about half were contemplating developing metric tariffs. Most motor bureaus were concerned about the transition to metric, primarily the potential cost. The responding rail tariff bureaus also had no metric

policy. None of their tariffs were metric, nor were the bureaus contemplating developing metric tariffs. Although there was no policy statement on metric transition among the responding water bureaus, almost half of their tariffs were metric. Most bureaus said they had encountered no problems using the metric system. One bureau, however, said metric would create more problems than it would solve. Water bureaus were the only shipping area to show an awareness of benefits from metric, primarily that of international compatibility. Nevertheless, water bureaus reported a mixed attitude toward metric use.

(3) Survey of industry producers whose goods are shipped (through ANMC Committees and the Grocery Manufacturers Association) to determine additional problem areas. ANMC Industry Sector Committee members represented product manufacturers and suppliers in the survey. The opinions expressed stemmed from Chemicals & Allied Products, Electronic Equipment & Components, Instruments, and Metals sectors. (The Fiberglass, Machinery, Power Generation, and Textiles sectors indicated no problems with the metric conversion of tariffs.) Survey results showed that the lack of metric tariffs was hindering the implementation of some sector metric plans. Conversion would proceed but unresolved tariff questions would inevitably complicate revenue and cost determinations. Gradual conversion could lead to massive confusion, some reported, and there would be a need for training to avoid calculation and interpretation errors. Some respondents felt the key was obtaining agreement on conversion factors, and that those factors should substitute for the need to convert each individual rate.

The survey responses from 55 Grocery Manufacturers Association members indicated that the need for metric tariffs was not a current concern for most of the industry, but would be within three to seven years. Nevertheless, for a quarter of the respondents, the availability of metric tariffs would be a factor in developing company plans for metric transition. Problems cited in relation to tariff conversion included employee training and its resulting cost, reprogramming computer data systems which reference tariff rates, and packaging and loading problems.

In 1982, ANMC developed and finalized the Standard Reference Tables for Metric Conversion of Transportation Tariffs (The Tables were adapted from the Canadian Master Guide for Metric Conversion of Tariffs). These Tables were developed to assist the transportation industry in establishing the capability to receive and ship goods in metric units and to seek agreement on the use of consistent conversion factors by all segments of the shipping industry. The Tables provide metric conversion of commonly used units and rates to enable carriers to satisfy customers who want to ship by metric units or who want rate information in metric terms. The Tables assure that everyone uses the same factors for conversion. Prior to the availability of these Tables, different conferences calculated the same things differently, causing costly problems and delays to the shippers and poor customer relations.

On August 12, 1982, the Interstate Commerce Commission (ICC) granted the ANMC Standard Reference Tables an ICC Special Tariff Authority (No. 82-10600). In doing so they stated:

> ..."The Commission is cognizant of the vast number of tariffs, reports, operating authorities, and regulations on file and in effect which contain measurements of weight, size, distance, or volume stated in the customary units."
>
> ..."To encourage and facilitate conversion, we will authorize carriers and agents to refer to the conversion publication."

This is only the second time in ICC history that such status has been granted to a document of this type; the first time was to the U.S. Zip Code Guide.

The existence of these Tables and the ICC endorsement of their use represents an important metric transition facilitator for all industry activity. Industry now has the ability to receive and ship all different goods in metric units. No longer will the existence of inch-pound transportation tariffs stand in the way of metric transition efforts of any company. In addition, the approval of the federal government of the use of metric units in the tariff and transportation area provides industry the necessary support it needs to deal in metric in this heavily regulated arena. Without the private/public endorsement of the Standard Reference Tables no metric activity could occur in transportation tariffs; now that activity is possible.

Cost Savings

A factor which most clearly impacts all industry decisionmaking is the economic aspect, or costs and savings. In the long or short term, any process that can save money is implemented quickly. Many corporations in various industry segments have realized and reported substantial cost savings by converting a part or all of their operations to metric. These experiences make cost savings an influential cross-cutting factor. Examples include:

General Motors, which avoided costs of $1.6 million annually through resizing and reduction in a variety of electric wire. Savings in this single division over a six-year period more than paid the corporate costs of metric transition.

IBM, which adopted metric size fasteners which resulted in more than 38,000 part numbers being reduced to about 4,000. Adoption of metric position dimensioning in computer software resulted in a $2 to $5 million savings.

Caterpillar, which realized cost reductions of between $900,000 and $1 million a year from metric transition through eliminating redesign in overseas plants and reducing the number of steel sizes required.

Deere, which gained cost savings of $300,000 a year by using metric materials in constructing their products.

Fresh fruit and vegetable industry, which adpoted a series of five geometrically related, metric-dimensioned shipping containers to take the place ofmore than 500 in current use, a move estimated to save the industry $300 million a year.

Dupont, which realized cost savings of more than $200,000 a year from a change in the package of one product.

Red Lobster a subsidiary of General Mills, which switched to the metric system for cutting of seafood portions and gained a 4% to 5% reduction in waste and inefficiency.

The above examples are given to make the point that there are cost savings associated with metric transition. This fact is a major positive motivating factor for companies to pursue the changeover to metric measures in a variety of industries.

APPENDIX B

THE STATUS OF METRIC
IN THE UNITED STATES
GOVERNMENT

DEPARTMENT OF CONSUMER &
CORPORATE AFFAIRS
LIBRARY
JUIN
JUNE 1984
BIBLIOTHÈQUE
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Y8-MON-1984/23 (APP. B); E; C

TABLE OF CONTENTS

APPENDIX B STATUS OF METRIC ACTIVITIES IN THE UNITED STATES GOVERNMENT

- Interagency Committee on Metric Policy, Department of Commerce (ICMP) B-1
- U.S. Department of Agriculture (USDA) B-3
- Department of Commerce (DOC) B-5
- Department of Defence (DOD) B-9
- Department of Education (DEd) B-14
- Department of Energy (DOE) B-16
- Federal Communications Commission (FCC) B-19
- General Services Administration (GSA) B-22
- Department of Health and Human Services (HHS) B-26
- Housing and Urban Development (HUD) B-29
- International Trade Commission (ITC) B-31
- Department of the Interior (DOI) B-34
- National Aeronautics and Space Administration (NASA) B-36
- State and Local Governments B-42
- Tennessee Valley Authority B-47
- Department of Transportation (DOT) B-49
- Veterans Administration (VA) B-52

APPENDIX B

SUMMARY

GOVERNMENT: INTERAGENCY COMMITTEE ON METRIC POLICY - DEPARTMENT OF COMMERCE

1. Summary

The central policy making body of the Federal Government regarding metric, is the Interagency Committee on the Metric Policy (ICMP). The committee consists of high level policy officials from the major agencies in the Federal Government. The Metrication Operating Committee (MOC) of the ICMP does most of the substantive work on metric policy. The ICMP often ratifies decisions made by the MOC. After a brief hiatus following the demise of the U.S. Metric Board (USMB), the ICMP and MOC have been reactivated. Most notably, the ICMP has recently unanimously approved the proposed change in Federal Standardization Policy to accept the use of metric measurements in Federal standards (see GSA summary).

The relationship of the ICMP to private sector organizations such as the American National Metric Council (ANMC) is ambiguous. ANMC has an official position on the MOC. Specifically, ANMC is a member of the Industry Liaison Committee of the MOC. At present, ANMC has no official position on the ICMP though they are usually invited to the ICMP meetings. At the most recent meeting they gave a presentation on their activities and the status of conversion in the U.S.

The Office of Metric Programs can furnish information on ICMP or MOC activities. It is the secretariat for both committees. The next contacts are the members of the executive committee of the MOC. For more information, contact MOC members. ICMP members are hard to contact and likely to refer you to the MOC member for specifics.

MOC is also a good source of information on activities in specific agencies. They put out a bi-annual Federal status report. The 1982 report is attached.

The following attachments in Appendix G give more information on the ICMP and the MOC:

- Organization chart
- Press releases from ICMP Meeting of September 21, 1983
- MOC Minutes of January 18, 1983 meeting
- ICMP 1982 Annual Report
- ICMP 1981 Annual Report

2. Industry Coverage

The Interagency Committee on Metric Policy (ICMP) was created in 1978 to coordinate Federal agencies' metric conversions. It was inactive in the latter part of FY 1982 because of the uncertainty of future Federal involvement in metric issues after the abolition of the U.S. Metric Board. OMP has reactivated the ICMP with the Assistant Secretary for Productivity, Technology and Innovation as Chairman. The ICMP is composed of members at the assistant secretary level from 38 Federal agencies. It coordinates Federal metric conversions to prevent conflicting policies and practices.

At a January, 1983 meeting of the MOC, the ICMP presented draft copies of its Third Report of the Interagency Committee on Metric Policy and copies of a draft memorandum of the revision of the Federal Metric Information Referral Directory. The MOC agreed that the memorandum be sent. Also at that meeting, ICMP asked for comments on agency problems with their "Resolution on the Use of Metric Units in Agency Press Releases" and the supplementary "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units." No agencies indicated problems with the Resolution, so no policy change will be considered at this time.

The ICMP recently voted unanimously to back changes in Federal regulations which will open the way to inclusion of metric units in government purchasing specifications. The General Services Administration, which manages government procurement, will issue guidance to Federal agencies on working with the private sector to develop metric standards and specifications. Changes will be made during the normal review cycle, as required by the Code of Federal Regulations. It is felt that the implementation of this new policy will remove a significant barrier to companies that convert to metric.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

AGENCY: U.S. DEPARTMENT OF AGRICULTURE

	NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT: CURRENT METRIC ACTIVITY		■			
PAST: METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE: METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Procurement	Press Releases	Regulations
■	☐	☐	■	☐

OTHER Reporting crop statistics

FORMAL METRIC POLICY? None ☐ Yes ■ (being revised)

OTHER COMMENTS

SUMMARY

GOVERNMENT: U.S. DEPARTMENT OF AGRICULTURE (USDA)

1. Summary

Metric has not received much attention at the Department of Agriculture in recent years. Most activity has focused on the reporting of crop statistics. Interest may be increasing with the recent reorganization placing metric activity under the Assistant Secretary for Science and Education. The metric policy of USDA is being redrafted with an emphasis on toning down the aggressive pro-metric language of the previous policy.

2. Agency Covered

The Department of Agriculture (USDA) works to improve and maintain farm income and to develop and expand markets abroad for agricultural products. The Department helps to curb and to cure poverty, hunger and malnutrition. It works to enhance the environment and to maintain U.S. production capability by helping landowners protect the soil, water, forests, and other natural resources. Rural development, credit, and conservation programs are key resources for carrying out national growth policies. USDA also funds and does research. The Department, through inspection and grading services, safeguards and assures standards of quality in the daily food supply.

3. Current Status

- The locus of responsibility for metric coordination is now under the Assistant Secretary for Science and Education.
- The organization for metric conversion in USDA has been moribund over the past several years. They anticipate reviving the intra-agency committee on metric in the near future.
- USDA accepts the ICMP resolution on press releases.
- International crop statistics are reported in metric units. U.S. crop statistics are reported primarily in customary units. However, each report has a summary table using metric units to facilitate comparison to international statistics.

- The USDA is a large purchaser of food and food commodities. Almost all of these procurements specify customary measurements.

- USDA participates on several ANMC committees primarily as an observer.

- Metric is very much on the back burner at USDA.

4. Prospects for Conversion

With the organizational shift in responsibilities for metric activities, interest appears to be growing in regard to educational efforts. The USDA policy is being revised to make it less forceful, but the intra-agency committee on metric is being revived. USDA is increasing its use of metric, especially in the reporting of U.S. crop statistics.

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF COMMERCE

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Procurement	Press Releases	Regulation
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	■	☐

OTHER Office of Metric Programs

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

SUMMARY

GOVERNMENT: DEPARTMENT OF COMMERCE (DOC)

1. Summary

The metric activity of the Department of Commerce (DOC) changed significantly over the past year with the demise of the U.S. Metric Board and the creation of the Office of Metric Programs (OMP) within the Department of Commerce. OMP works to counter the public perception of a decline in the importance of the metric issue. It has also revived the Interagency Committee on Metric Policy (ICMP) as well as identified potential obstacles to the use of metric measurements posed by Federal laws, regulations, or standards. OMP anticipates focusing more of its activity in the coming years on metric in international trade and in developing a means of assessing the status of metric in the U.S. using Department of Commerce industry analysts and private sources. They are currently directing research on the role of metric in U.S. exports. There is little prospect of increasing support for the OMP beyond its current modest budget and personnel allocation.

2. Agency Covered

The Department of Commerce encourages, serves, and promotes the Nation's international trade, economic growth, and technological advancement. Within this framework and together with a policy of promoting the national interest through the encouragement of the competitive, free enterprise system, the Department provides a wide variety of programs. It offers assistance and information to help increase exports, administers programs to prevent unfair foreign trade competition, provides social and economic statistics and analyses for business and government planners, provides research and support for the increased use of scientific, engineering, and technological development, grants patents and registers trademarks, provides assistance to promote domestic economic development, seeks to improve understanding of the earth's physical environment and oceanic life, promotes travel in the United States by residents of foreign countries, and assists in the growth of minority businesses.

3. Current Status

Various activities have occurred during the past year in DOC organizational units concerning the use of the metric system in the U.S.

- The OMP is working with the International Trade Administration's (ITA) Office of International Exhibitions to assure that dual measurements are displayed at the New Orleans and Chicago World Fairs. This activity will reinforce U.S. public awareness of the metric system and serve as a courtesy to foreign visitors.

o The Office of General Counsel has provided legal counsel to the OMP since October 1, 1982. They have rendered legal opinions and have assisted in the drafting of several documents.

o The Office of Public Affairs is discussing a directive on the use, where appropriate, of metric units in press releases. This would involve dual labeling. Eleven Federal agencies now follow this practice.

o Revision of the handbook "Metric Laws and Practices in International Trade" was completed in 1982 by the ITA. The handbook acquaints U.S. exporters with metric usage and requirements among U.S. trading partners.

o OMP surveyed the Department of Commerce's U.S. and Foreign Commercial Services about the role of metric in U.S. exports. The survey revealed that the Services get very few requests or complaints or concerns expressed about metric. The problems that do arise are usually handled by looking at a conversion table or referring to the packaging laws of a particular country. Most officers feel that industry is handling metric on its own. Many feel the importance of metric labeling as well as metric design will increase with growing international competition and decreasing dependence on U.S. manufacturers and distributors.

o The National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA) chaired the Working Group on Metric Implementation which reached the following conclusions: Federal Standard Definitions for weather parameters should include all weather elements and should be changed to metric; all instrumentation should be procured for recording and readout in standard metric units and, if required, have the capability to readout nonmetric; all Federal Automated Weather Information Systems should use metric units as the common denominator; the Ad Hoc Group on Automated Weather Information Systems should change the FCM-S2-1982 Standard Formats document to standardize on metric units.

o The National Ocean Service (NOS) of NOAA presently produces 14 metric charts of domestic and adjoining waters; the bathymetric mapping program produces 44 maps in metric units. Published geodetic data are given in both inch-pound and metric units. Metrication of the Great Lakes charts is being carried out in a cooperative plan with the Canadian Hydrographic Service.

o The Office of Oceanic and Atmospheric Research (OAR) of NOAA has used metric units in research programs for some time. Complete conversion will require the conversion of available instrumentation to metric readouts.

o The National Bureau of Standards continues its assistance in defining the metric system.

4. Prospects for Conversion

The implementation of the Department of Commerce Programs and Guidelines for Metric Conversion for metricating all appropriate activities by 1985 has been held in abeyance, pending the clarification of the U.S. policy on metric conversion. There is little prospect of increasing support for the Office of Metric Policy beyond its current modest budget and personnel allocation.

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF DEFENSE (DOD)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	■	■	■	■	☐

OTHER ____________________

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FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

SUMMARY

GOVERNMENT: DEPARTMENT OF DEFENSE (DOD)

1. Summary

The Department of Defense (DOD) is one of the most active Federal agencies regarding metric. As a result, the procedures for using metric products and services in the military services and the other Defense agencies are established or being established. However, implementation of the procedures has not kept pace with initial expectations. DOD is now giving renewed emphasis to metric and expects more activity in the near future. This will be especially true of defense systems based on foreign designs or intended for extensive use in NATO nations. The goal of this activity is to promote interchangeability and interoperatility of equipment and materiel with our allies, facilitate joint production programs and simplify supply operations. DOD must pace itself to conversion in private industry in order to ensure technical and economic feasibility. (See Department of Energy summary for a description of nuclear weapons design and production.)

2. Agency Covered

The major elements of the Department of Defense are the Army, Navy, Marine Corps, and Air Force, consisting of about 2 million men and women on active duty. Of these, some 475,000 — including about 50,000 on ships at sea — are serving outside the United States. They are backed, in case of emergency, by the 2.5 million members of the reserve components. In addition, there are about 1 million civilian employees in the Defense Department.

Under the President, who is also Commander in Chief, the Secretary of Defense exercises direction, authority, and control over the Department, which includes the separately organized military departments of Army, Navy, and Air Force, the Joint Chiefs of Staff providing military advice, the unified and specified combatant commands, and various Defense agencies established for specific purposes.

3. Current Status

- Two documents laid the groundwork for DOD policy toward metric: DOD Directive 4120.18 "Metric System of Measurements" (1/28/80) and DOD Instruction 4120.23 "DOD Metrication Plan" (3/22/83) (see attached).
- DOD has a Metric Coordinator as well as a Metrication Steering Group (MSG) comprised of metric coordinators of the different services and Defense agencies such as the Defense Logistics Agency. At present, members of the MSG are at the operational level.

- Metric should be used for all new designs for DOD unless there are technical, economic, or other reasons not to do so.

- There are several weapons systems that are metric or use metric parts or components. These include the Multiple Launch Rocket System — a new mobile missile system based on an Israeli design, the VTXTS Navy trainer aircraft being produced jointly by McDonnell Douglas and British Aerospace, and the X-1 tank's 120mm smooth bore gun based on a German design.

- Most weapons systems now under development or production were designed before the Metric Act was passed and before DOD metric policy was established. For example, the B-1 now under consideration is based on an older design that is done in customary units. Given the long lead times for weapons development and production, systems that are designed today in metric units will not be in the field until the mid 1990's.

- The MX missile was an early test of the DOD metric policy. Initially the DOD asked for quotes on producing a metric missile. While the metric MX appeared more costly in the last 1970's when the cost analysis was done, DOD declined to go metric on the MX for other reasons. The MX, as it was then envisioned, would use several different types of modular systems, "black boxes". Some of these would be customary and some would be metric. Since many of these black boxes were critical to the success of the mission, confusion over whether the box used metric or customary parts and hardware could impair the mission. This was the primary reasons DOD decided to go with customary units on the MX.

- Given the long lead time and life span of weapons systems, DOD must assess the likelihood that metric will be prevalent in the economy by the time the system is operational. For this reason, they are particularly interested in the momentum and pace of conversion in industry. DOD is very active in ANMC sector committees. In 1981, they had 68 representatives on 37 sector committees.

- Early in the Defense Acquisition process, at Defense Systems Acquisition Review Council (DSARC) Milestone I -- just prior to full scale development, the program officer for the weapons system is required to justify the decision if the weapons system is not being designed in metric. This requirement has been honored more in the breach than in the observance. However, DOD is preparing guidelines for program officers to use in making their metric presentations at DSARC I. The review of the metric decisions of the program officers is expected to be more regular and rigorous once these guidelines are established. The key point in these procedures will be estimating the initial or acquisition cost as well as the costs associated with reliability, maintainability, operability, and logistics over the lifetime of the system. The program officer will have to compare the lifecycle costs of customary systems against the lifecycle costs of metric systems.

- It is not DOD basic policy to convert existing systems or products to metric. For example, converting the drawings for a Ground to Air missile for use in Europe costs $6 million.

- DOD conversion will depend on the ability of industry to provide cost competitive metric products.

- DOD intended to have a full set of metric standards available for use in weapons systems by 1990. Progress on developing these standards has been slower than anticipated. With the strengthening of metric requirements in the acquisition process, there should be greater progress in the near future. The Defense Industrial Supply Center in Philadelphia monitors the status of metric document preparation on an annual basis.

- Metric hardware has increased in DOD supplies. The Defense Industrial Supply Center found over 4,000 metric parts in its inventory in early 1983. While that is not a large number compared to the total number of parts, it is a significant growth over the past several years. Many of these metric parts are based on DIN standards.

- Metric is used in DOD press releases where appropriate.

- Training on metric has been incorporatd into existing educational programs in the Department and the services.

- DOD prepares an annual report on metrication in DOD. These are normally out by the first quarter of the following year.

- As a result of a memorandum dated November 29, 1983, DOD is seeking a review of all of its standardization documents to determine which of them will need a comparable metric version. It is planned to budget for and prepare the needed documents to meet the goal established by DODI 4120.23 of having available a complete body of metric specifications and standards by 1990.

4. Prospects for Conversion

- A major factor behind DOD interest in metric is the need to be interoperable with weapons systems of other NATO nations. The idea is that if in a battle one country's supplies are destroyed or cut off, they will be able to use the supplies of another NATO nation. Interoperability presents a number of difficult issues for DOD and its suppliers such as patent rights, royalty payments, proprietary designs, and potential import dependence. These are reasons why DOD may not be as strong in pushing interoperability in the future. However, the political and strategic realities confronting the U.S. as a member of of NATO push toward greater interoperability. This interoperability will require metric production.

- DOD will convert only as far as it must to meet NATO requirements. Otherwise, it will follow the lead of industry in using metric. If industry is converting and can offer a cost competitive metric product over the lifecycle of the weapons system, then DOD will buy it.

- Metric activity is likely to increase in the DOD with the strengthening of the acquisition procedures related to metric.

- The loss of U.S. leadership in a number of technological areas will cause increased use of foreign designs in DOD systems. This will also increase the DOD use of metric products and components.

- With faster turnover in military weapons systems technology, there will be more and sooner opportunities to use metric in weapons systems designs.

- Metric will not show up in operational DOD systems to any significant extent until at least the mid 1990's.

5. Sources

In addition to the metric coordinator, there are several other good sources of information on DOD metric activity:

- the metric coordinators of the services for information on specific weapons systems,

- the executive secretariat of the Metrication Steering Group for details om department wide initiatives,

- the metrication program manager of the Defense Industrial Supply Center for the status of metric procurement in military hardware for aerospace as well as non aerospace uses.

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3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF EDUCATION (DEd)

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ■ Standards ☐ Procurement ☐ Press Releases ☐ Regulations ☐

OTHER ______________________________

____

FORMAL METRIC POLICY? None ■ Yes ☐

OTHER COMMENTS

SUMMARY

GOVERNMENT - DEPARTMENT OF EDUCATION (DEd)

1. Summary

The Department of Education (DEd) spent approximately $9 million on metric education between 1977-1981. After 1981 such discretionary funds were collapsed into block grants to states. Metric education is eligible for support under Chapter II of the Education Consolidation Act, but decisions about its support are left to the discretion of State and local governments. The DEd ceased to influence metric education in the nation's schools., The DEd has no formal metrication plans at this time. Metric education is left to the discretion of the state and local governments.

2. Agency Covered

The United States Department of Education administers approximately $14 billion in educational programs, representing about 9% of the total cost of public education. Apporoximately 130 separate programs have been authorized by Congress, with most of the support funds being channeled through State Education agencies. Some of the funds go directly to local education agencies and institutuions of higher education, and some of the fundsa re allocated through discretionary programs where those seeking program support, apply directly to the Department of Education. Several program support direct services from the Department of Education, for example support the National Center for Education Statistics, which collects and disseminates statistics and other data related to education in the United States and in other nations.

3. Current Status

As an outcome of the Metric Education Act, 1974, the U.S. Department of Education was allocated funds to promote and assist in the development of metric education nationwide. Between fiscal 1976 and 1980 the agency funded programs in Puerto Rico, Guam, Samoa and the States. In a peak year,75 different education projects on metric were being supported. Consortia of agencies and school systems were formed to help ensure the maximum impact of the $2 million annual funding. These projects, which included basic education in metric and programs for specialized areas, such as engineering, ended in 1981 when discretionary funds were folded into block grants to states. Repositories of products from the national metric program are located in State Education agencies. Activity in the DEd now consists of membership on the metrication Operating Committee of the Interagency Committee on Metric Policy. Metric materials and information about metric education projects are currently available on request.

4. Prospects for Conversion

At this time there are no prospects for the DEd to increase its metric activities. Metric education in the U.S. is left to the discretion of State and local governments and the private sector.

(Note: For more on Education, see Educational Services in Appendix A)

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DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF ENERGY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning ■ Standards ☐ Procurement ■ Press Releases ■ Regulations ☐

OTHER ______________________________

FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

SUMMARY

GOVERNMENT: DEPARTMENT OF ENERGY (DOE)

1. Summary

The department of Energy (DOE) has adopted a wait and see attitude toward metric conversion. While a metric policy has been developed there has been little action at any level of the department. There is some use of metric in technical documents and in procurement -- especially in the nuclear area. All new nuclear warheads are designed in metric. There is little prospect of change until the Federal Government or industry takes a more aggressive approach to metric conversion.

2. Agency Covered

The Department of Energy (DOE) provides the framework for a comprehensive and balanced national energy plan through the coordination and administration of the energy functions of the Federal Government. The Department is responsible for long-term, high-risk research and development of energy technology, the marketing of Federal power, energy conservation, the nuclear weapons program, energy regulatory programs, and a central energy data collection and analysis program.

3. Current Status

- A metric policy has been developed but little effort has been put into implementing it. Metric is a low priority issue for DOE.
- Most internal directives are not measurement sensitive. Those few that are remain in customary units.
- DOE has little direct regulatory impact on the private sector. Most of its regulations use customary measurements.
- On technical publications, the picture is mixed. The Oak Ridge National Laboratory is aggressively pushing the use of metric in documents. Other divisions are less aggressive.
- DOE makes the nuclear warheads for the military. Following the purchase of metric capable machine tools, the weapons labs can produce in metric units. All new designs for nuclear weapons will be in metric dimensions.

- DOE accepts the resolution on metric in press releases but finds few occasions to use it.

- Most procurement is in customary units. However, some areas such as nuclear equipment use metric. The Bonneville Power Administration has recently changed to building all of its new substations in metric units.

- Since SI radiological units appear larger than commonly used customary measures, professionals and, more importantly, the public could become confused and possibly alarmed by a switch to SI units for radiation measurements.

4. Prospects for Conversion

Metric is clearly on the back burner at DOE. Until the Federal Government takes a more aggressive approach, DOE will keep a low profile on metric. It will buy metric products and use metric measurements in areas of science and engineering.

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DIAGNOSIS OF METRIC SITUATION

AGENCY: FEDERAL COMMUNICATIONS COMMISSION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	■	■

OTHER ____________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

SUMMARY

GOVERNMENT: FEDERAL COMMUNICATIONS COMMISSION (FCC)

1. Summary

The FCC is active in metric. As the agency responsible for regulating the nation's communications systems--television, radio, and others--they are involved in measuring signal dispersions as well as distances between antennae and height of antennae or towers. The FCC is currently working on changing its FM regulations to metric units. They plan to convert regulations governing television and AM radio to metric. When this is accomplished, most likely within next ten years, FCC will be 95% metric since these regulations are the backbone of FCC activity. Extensive involvement in international agreements using metric units is pushing FCC toward conversion.

2. Agency Covered

The Federal Communications Commission (FCC) regulates interstate and foreign communications by radio, television, wire, and cable. It is responsible for the orderly development and operation of broadcast services and the provision of rapid, efficient nationwide and worldwide telephone and telegraph services at reasonable rates. This also includes the promotion of safety of life and property through radio and the use of radio and television facilities to strengthen the national defense.

3. Current Status

- FCC is currently working on converting FM contour curves--statements of the dispersion of the radio signal over an area--to metric units. This means that all future applications will be filed using metric units.
- Some regulations of heights and distances related to transmitting and antennae have also been converted from round customary units such as six feet to round metric units such as 2 meters.
- There have been a few complaints that FCC has not already converted. One person submitted an application in metric and was asked to redo it in customary measurements. As the curves for FM and AM and television are converted, this problem will disappear.
- FCC press releases use metric where appropriate.
- Pressure to conform with international conventions and agreements, rather than industry pressure, is pushing FCC toward conversion.

4. Prospects for Conversion

- Conversion of television curves is expected in the near future.
- FCC is converting to metric with little internal or external problem.
- Metric conversion will happen eventually even though it is a low priority issue for FCC.

DIAGNOSIS OF METRIC SITUATION

AGENCY: GENERAL SERVICES ADMINISTRATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION			■		

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Procurement	Press Releases	Regulations
☐	■	■	☐	☐

OTHER ______________________________

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FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

Many people in the federal government cite GSA and Defense as the two most active government agencies in terms of metric.

SUMMARY

GOVERNMENT: GENERAL SERVICES ADMINISTRATION (GSA)

1. Summary

The General Services Administration (GSA) builds, buys, maintains, and operates much of the U.S. government's real and personal property. The GSA has recently proposed a change in Federal procurement procedures to identify and remove, with the help of industry representatives, any barriers to buying metric products or services resulting from existing standards and specifications. At present, GSA buys very few metric products, less than 10% of the value of their total purchases. Very few specifications and standards use metric. With the proposed changes, the process for purchasing metric products will be in place, which will allow purchases of cost competitive metric products.

2. Agency Covered

The General Services Administration (GSA) establishes policy and provides for the government an economical and efficient system for the management of its property and records, including construction and operation of buildings, procurement and distribution of supplies, utilization and disposal of property, transportation, traffic, and communications management, stockpiling of strategic materials, and the management of the government-wide automatic data processing resources program. GSA consists of operating services and supporting staff offices, with functions carried out at three levels of organization: the Central Office, regional offices, and field activities.

3. Current Status

- GSA has had a metric policy since 1981, a metric coordinator, and an intra-agency committee on metric. The metric coordinator is the primary contact in the agency as regards metric issues.
- GSA accepts the ICMP press release policy but has little opportunity to implement it since few of their press releases involve measurements.
- Metric activity in GSA is in procurement. Very little of what GSA buys and almost none of what it builds is metric. Less than 10% of GSA dollar value of purchases is metric. Automobiles and machine tools are the notable exceptions.

- The major metric activity in GSA has been to develop procedures for identifying and removing barriers to metric procurement should industry offer metric products. GSA recently proposed a change to the Code of Federal Regulations (see Appendix G) which allows the use of metric measurements in Federal standardization documents. Until now, contract officers have used their discretion in allowing metric measurements. The proposed change was approved unanimously by the ICMP and is expected to be officially adopted by the end of 1983.

- GSA is changing the Federal Standardization Handbook to include two paragraphs specifying the procedures for using metric in preparing standards and specifications. This activity will proceed whether or not the change in the Code of Federal Regulations is approved. As part of the change in the standardization process, GSA has published a list of metric units prepared and adopted by the Metrication Operating Committee to be used as a Federal Standard (see Appendix G).

- All standards and specification throughout the government including GSA's are required to be reviewed every five years. With the change in the standardization process, this review will include assessing whether or not to add metric equivalents to the standards. In some cases, these equivalents may be exact soft conversions of customary sizes. In other cases, the metric equivalents may be the closest round metric size. An engineering review of the standard or specification will determine which type of equivalent is appropriate.

- GSA, as head of the Industry Liaison Committee of the ICMP, will respond to requests from industry for changes in Federal standards and specifications to allow metric procurement. If GSA learns from industry that Federal specifications inhibit the sale of a metric produt, GSA will accelerate the review of that standard or specification. ANMC is the most likely source of requests for such accelerated reviews.

- Under OMB Circular A-119, GSA and the other Federal agencies are to refer to private voluntary standards wherever possible. Therefore, the Federal government is most likely to use metric standards developed by organizations such as ASTM or members of ANSI. Active development of metric standards by industry will accelerate the conversion of Federal standards and specifications.

4. Prospects for Conversion

- The system for identifying and removing barriers to metric procurement should be in place by the end of 1983. Standards and specifications conversion, as well as their implementation, will depend on the pace of conversion in the private sector.
- Given the fragmented nature of the construction industry, conversion of GSA construction to metric in the near future is unlikely.
- Metric will increase its percentage of metric supplies only when metric products are the best buy in terms of current price and cost of repair and replacement.
- The pressure to keep inventories down will delay the shift to metric in GSA. When metric becomes predominant in the market, GSA will be more likely to buy metric products. GSA will not be a leader in metric procurement.
- As GSA moves to more use of private standards, to buying more off-the-shelf items, and toward increased competition in procurement policy, industry's conversion to metric becomes an even more important indicator of Federal metric conversion.

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DIAGNOSIS OF METRIC SITUATION

AGENCY: HEALTH AND HUMAN SERVICES

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY			■		
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulation
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER ______________________________

____

FORMAL METRIC POLICY? None ■ Yes ☐

OTHER COMMENTS

Most activity in HHS is in the Food and Drug Administration which regulates 25% of the consumer's dollar.

SUMMARY

GOVERNMENT: DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

1. Summary

Metric activity in the Department of Health and Human Services (HHS) is concentrated in the Food and Drug Administration (FDA) within the Public Health Service (PHS). Internal directives and methodological regulations are largely in metric. Where FDA regulations deal with consumer products and labeling, conversion is less advanced. As the food industry converts to metric, the role of metric in FDA regulations will increase. Other sections of the Public Health Service such as The National Institutes of Health use metric in accordance with professional practice in medicine and medical research.

2. Agency Covered

The Secretary of HHS advises the President on health, welfare, and income security plans, policies, and programs of the Federal Government. The Secretary directs Department staff in carrying out the approved programs and activities of the Department and promotes general public understanding of the Department's goals, programs, and objectives. The Secretary administers these functions through the Office of the Secretary and the five Operating Divisions, which include: the Social Security Administration, the Health Care Financing Administration, the Office of Human Development Services, Office of Community Services, and the Public Health Service.

3. Current Status

Much of HHS is science based, especially the Public Health Service. Therefore, it operates to a large extent in metric. The FDA's metric activity is most pertinent to consumers. FDA regulates 26% of the products and services consumed by the public. Metric activity in FDA consists of directives and regulations governing testing methodologies and dual-labeling in metric products used by consumers.

- Most of the activity related to metric in FDA relates to the Fair Packaging and Labelling Act (FPLA). FPLA prohibits metric-only labeling of net unit content weight. Dual-labeling with metric first is acceptable.

- FDA regulations on testing methodologies for food and drugs are largely in metric units.

- As regulations are reviewed, metric equivalents are being added. The agencies are required to review their regulations at regular intervals.
- In new regulations, metric is being used wherever possible.
- The key concerns for FDA are to avoid appearing to force metric on the public and to reduce confusion for the consumer.
- FDA press releases tend not to use metric units. Most FDA press releases are recall notices. If the original product is packaged in metric then the recall will be in metric. Otherwise the customary measurements are used.
- FDA does little procurement. FDA labs buy metric equipment as needed.
- FDA works with state and local officials through the National Conference on Weights and Measures.

4. Prospects for Conversion

Customary measurement for consumer products will be around for a long time. The FDA will convert where they are able to do so without confusing the consumer. The two tier approach -- metric for lab testing and certifying and dual-labeling for the public -- will continue for the near term future.

DIAGNOSIS OF METRIC SITUATION

AGENCY: HOUSING AND URBAN DEVELOPMENT

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Procurement	Press Releases	Regulations
☐	■	☐	☐	■

OTHER ______________________________

____

FORMAL METRIC POLICY? None ■ Yes ☐

OTHER COMMENTS

SUMMARY

GOVERNMENT: HOUSING AND URBAN DEVELOPMENT (HUD)

1. Summary

There is very little metric activity in Housing and Urban Development. There is little prospect of increased metric activity in HUD given the minimal pace of conversion in the construction industry.

2. Agency Covered

The Department of Housing and Urban Development (HUD) is the principal Federal agency responsible for programs concerned with housing needs, fair housing opportunities, and improving and developing the Nation's communities. To carry out its overall purpose of assisting the sound development of our communities, HUD administers mortgage insurance programs that help families to become home owners; a rental subsidy program for lower income families who otherwise could not afford decent housing, antidiscrimination in housing activites; and programs that aid neighborhood rehabilitation and the preservation of our urban centers from blight and decay. HUD also protects the home buyer in the marketplace and fosters programs that stimulate and guide the housing industry to provide not only housing but a suitable living environment.

3. Current Status

- HUD's metric coordinator spends little time on metric.
- HUD regulations allow the use of metric in minimum property standards for public housing and FHA mortgage insurance. However, metric is rarely used. Puerto Rico uses metric in its minimum property standards for public housing.
- HUD regulations do not inhibit the use of metric in applying to HUD for approvals or other actions. However, few HUD field personnel are familiar with the use of metric in housing.
- Several years ago HUD held a metric familiarization course at headquarters. It was well attended but not repeated.
- HUD accepts the ICMP resolution on press releases but finds little occasion to use it, since most press releases do not involve measurements other than monetary.

4. Prospects for Conversion

HUD will follow industry's lead on metric. It will be a long time before single family home construction goes metric. At present the Builders, Officials, and Code Administrators Model Code allows metric and customary measurements. However, metric is rarely used. The most likely place for metric to be used in construction is by larger firms using modular construction and in looking for ways to minimize waste.

DIAGNOSIS OF METRIC SITUATION

AGENCY: INTERNATIONAL TRADE COMMISSION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
	MOMENTUM OF CONVERSION				■	

	Planning	Standards	Procurement	Press Releases	Regulation
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	☐	☐	■

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	■	☐

OTHER COMMENTS

Momentum is considered high because of the likely passage of the revised tariff schedules using metric measurments within the next five years.

SUMMARY

GOVERNMENT: INTERNATIONAL TRADE COMMISSION (ITC)

1. Summary

The current level of metric activity at the International Trade Commission is minor. The proposed revision of the U.S. Tariff Schedule involves changing most the measurements used in the classification to metric units. This is to facilitate trade among different nations. If the revisions are accepted, the Commission will operate largely in metric dimensions. The revisions of the tariff schedules are still under consideration. Passage is not likely within the next year. According to international agreement, the revised tariffs should be in force by January 1987.

2. Agency Covered

The United States International Trade Commission furnishes studies, reports, and recommendations involving international trade and tariffs to the President, the Congress, and other Government agencies. In this capacity, the Commission conducts a variety of investigations, public hearings, and research projects pertaining to the international trade of the United States.

3. Current Status

The major metric activity at ITC is the conversion of the Tariff Schedules of the United States into the nomenclature system of the Harmonized System. The products themselves would remain unchanged. Public comment on the metric aspects of the proposed revision has ben neutral. While companies see some increased costs, only a few have opposed the conversion.

Other than this activity, the ITC has little involvement with metric measurement. ITC is represented on the ICMP and the MOC. It has not adopted the press release resolution because it is concerned about confusion and inaccuracies resulting from soft conversion. They do not do any procurement that would involve metric measurement.

4. Prospects for Conversion

The proposed revision of the Tariff Schedule is likely to be accepted in the next two years. When it is, the ITC will be working largely in metric dimensions. Therefore, the momentum for conversion within ITC is high.

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DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF THE INTERIOR

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulation
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	■	■

OTHER ______________________________

____

	None	Yes
FORMAL METRIC POLICY?	☐	■

OTHER COMMENTS

SUMMARY

GOVERNMENT: DEPARTMENT OF THE INTERIOR (DOI)

1. Summary

Metric is not widely used in Department of the Interior activities which consist of managing the Nation's natural resources--water, lands, minerals, parks and wildlife. The Department does little direct procurement. The major exception is found in the Bureau of Reclamation which builds and maintains water systems in seventeen western states. The Bureau has performed some metric construction work; however, metric is used in a small portion of the overall construction work of the agency. There is little momentum for conversion within the Department. The momentum in the National Park Service has declined because of adverse reactions to metric signs posted in national parks. The Bureau of Reclamation is likely to continue its low level of metric procurement.

2. Agency Covered

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most nationally owned public lands and natural resources. This includes fostering the wisest use of land and water resources, protecting fish and wildlife, preserving the environmental and cultural values of national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under United States administration.

3. Current Status

The major metric activity in the Department of Interior is in the Bureau of Reclamation. A small percentage of their new designs are done in metric each year. The mid-Pacific region is more active in designing in metric than others. However, in no region is metric a major activity. The largest current metric project is the Yuma desalting plant. This facility is almost 100% metric. Most of the other metric projects in the Bureau are hybrid projects with overall dimensions of the project in metric and equipment in customary units since customary measurement is the least costly and most available. The number of metric projects in the Bureau is limited by the lack of new construction work. Much of the Bureau's work involves maintaining or retrofitting existing projects requiring use of customary parts.

The National Park Service has retrenched in its metric policy. They received some negative comments after converting signs in two national parks to metric first and customary units second. As a result, the policy has been changed to one of customary and metric with customary preferred. Some U.S. Geological Survey maps use metric contours.

The Department has a metric policy, a metric coordinator, and a metric committee. Metric is not a high priority for DOI. The Department has accepted the resolution on press releases but it is used in an uneven fashion. Some press releases may have metric measurement in one sentence and customary measurements in another.

4. Prospects for Conversion

Prospects for conversion are not bright. The retreat of the National Park Service from metric primary signs and the lack of new construction by the Bureau of Reclamation offer little potential for metric conversion. Also, the demise of the USMB is seen by some as an indication of the declining importance of metric as an issue.

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DIAGNOSIS OF METRIC SITUATION

AGENCY: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

	NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT: CURRENT METRIC ACTIVITY			■		
PAST: METRIC ACTIVITY DURING THE PAST FIVE YEARS			■		
FUTURE: METRIC ACTIVITY DURING THE NEXT FIVE YEARS			■		
MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Procurement	Press Releases	Regulation
☐	■	■	■	☐

OTHER ______________________________

FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

SUMMARY

GOVERNMENT: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

1. Summary

In some areas of NASA metric use is extensive - especially where international production or use is involved or where there is a high degree of scientific activity. The status of metric has remained relatively stable over the past three years. For the most part, NASA has reached a plateau in the use of metric. Those systems that could be converted easily have been; others which were originally customary remain in customary. There is little momentum to increase the amount of metric activity in NASA.

2. Agency Covered

The principal statutory functions of the National Aeronautics and Space Administration (NASA) are to conduct research for the solution of problems of flight within and outside the Earth's atmosphere and develop, construct, test, and operate aeronautical and space vehicles; conduct activities required for the exploration of space with manned and unmanned vehicles; arrange for the most effective utilization of the scientific and engineering resources of the United States with other nations engaged in aeronautical and space activities for peaceful purposes; and to provide for the widest practicable and appropriate dissemination of information concerning NASA's activities and their results.

3. Current Status

- NASA has a metric policy, a metric coordinator, and a metric committee consisting of the metric coordinators of the different centers.
- NASA is a major procuring agency within the Federal Government. If the application requires metric, the agency will buy metric parts or products. This is most likely to happen with international or scientific projects. The following tables give a recent breakdown of metric activity by different types of projects and by NASA centers.
- NASA is not implementing the press release resolution but its press releases contain both metric and customary measurements - sometimes employing two different measurement systems in the same press release.
- Most NASA procurement specifications are in customary measurements at present. Where it is appropriate - that is, where industry offers metric or where metric is desired for a mission - the specifications are changed.
- NASA is not actively involved in private sector metric planning. They take a relatively passive approach to metric conversion.

4. Prospects for Conversion

Conversion at NASA has reached a plateau. The activities that are likely to be metric, e.g., scientific and international programs and press releases, are metric. Other areas are unlikely to convert. As industry converts NASA will follow its lead. NASA will not lead industry in metric conversion.

SUMMARY OF NASA METRICATION STATUS

APRIL 25, 1983

INSTALLATION	USE OF METRIC vs U.S. CUSTOMARY UNITS PERCENTAGE		
	1980	1981	1982
KENNEDY SPACE CENTER	6	5	5
JOHNSON SPACE CENTER	10	10	10
MARSHALL SPACE FLIGHT CENTER	3	30	30
GODDARD SPACE FLIGHT CENTER	3	44	44
AMES RESEARCH CENTER	25	25	25
LANGLEY RESEARCH CENTER	50	50	62
LEWIS RESEARCH CENTER	20	25	28
JET PROPULSION LABORATORY	20	20	20
NATIONAL SPACE TECHNOLOGY LABORATORIES	3	3	3
HEADQUARTERS	10	10	10

USE OF SI BY AERONAUTICAL AND SPACE FLIGHT PROJECTS[1]

(Rough Order of Magnitude)

PROJECT	INSTALLATION	FABRICATION % METRIC	NON-FABRICATION % METRIC
IRAS	Ames Research Center	10%	95%
Galileo Probe	" " "	10%	95%
Quiet Short Haul Research Aircraft	" " "	5%	-0-
Tilt Rotor Research Aircraft	" " "	5%	-0-
Rotor Systems Research Aircraft	" " "	5%	-0-
Numerical Aerodynamic Simulator	" " "	10%	10%
12' Wind Tunnel Modification	" " "	10%	10%
40x80 Wind Tunnel Modification	" " "	10%	10%
Man Vehicle System Research Facility	" " "	10%	-0-
Vertical Motion Simulator	" " "	10%	-0-
COBE	Goddard Space Flight Center	15%	40%
GRO	" " " "	2%	20%
AMPTE	" " " "	10%	40%
ERBE	" " " "	2%	80%
TDRSS	" " " "	1%	20%
OPEN	" " " "	5%	30%
ASAP	" " " "	-0-	40%
MMS/FSS	" " " "	1%	2%
SOT	" " " "	-0-	40%
SMM	" " " "	-0-	60%
UARS	" " " "	20%	75%
ALOSS	" " " "	-0-	100%
TIROS	" " " "	5%	40%
GOES	" " " "	-0-	20%
Sounding Rockets	" " " "	-0-	10%
Galileo	Jet Propulsion Laboratory	10%	22%
IRAS	" " "	50%[2]	40%
SMEP	" " "	-0-	20%
Shuttle External Tank	Marshall Space Flight Center	-0-	5%
Shuttle Solid Rocket Booster	" " " "	-0-	5%
Shuttle Main Engine	" " " "	-0-	5%
CRRES	" " " "	-0-	50%

PROJECT	INSTALLATION	FABRICATION % METRIC	NON-FABRICATION % METRIC
Cosmic Ray Nuclei Experiment	Marshall Space Flight Center	-0-	80%
ASTRO I	" " " "	-0-	50%
Space Plasma Physics	" " " "	10%	50%
Recoverable Plasma Diagnostics Package	" " " "	-0-	50%
Solar Array Flight Experiment	" " " "	-0-	15%
Space Telescope	" " " "	10%	30%
Infrared Telescope	" " " "	-0-	10%
Tethered Satellite System	" " " "	60%	50%
Spacelab	European Space Agency/MSFC 2/	85%	90%
IUS	USAF/MSFC	-0-	10%
ATOPS	Langley Research Center	-0-	90%
LHS	" " "	-0-	>10%
ACEE	" " "	-0-	60%
LDEF	" " "	20%	50%
LSST Antenna	" " "	40%	95%
ERBE	" " "	20%	>90%
SAGE II	" " "	-0-	90%
HALOE	" " "	20%	90%

Notes:

1. Not a complete list of NASA flight projects. In addition, not all Centers report usage of SIs by project, but rather by general areas.

2. International program

LEWIS RESEARCH CENTER
USE OF SI BY RESEARCH AND TECHNOLOGY PROJECTS (1982)
(Projects with cost of $5M or greater)

PROJECT TITLE	FABRICATION PERCENT METRIC (ROM)*	NONFABRICATION PERCENT METRIC (ROM)*
Convertible Engine System Technology	0	0
Energy Efficient Engine	1	2
Large-Scale Advanced Propeller	2	25
Ceramic Applications in Turbine Engines	0	50
Advanced Gas Turbine Powertrain Development (Garrett Turbine Engine Co.)	0	0
Advanced Gas Turbine Powertrain Development (Detroit Diesel Allison)	90	10
Advanced Powerplant Technology Development	0	10
Automotive Stirling Engine	90	98
Gas Cooled Systems Technology Development	20	50
Ion Auxiliary Propulsion System	1	1
40 kW Fuel Cell Field Test Project	0	25
MOD 5A Wind Turbine	0	0
MOD 5B Wind Turbine	0	0
Base Band Processor	5	1
Atlas/Centaur, Shuttle/Centaur	0	0

***Rough Order of Magnitude**

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DIAGNOSIS OF METRIC SITUATION

AGENCY: STATE AND LOCAL GOVERNMENTS

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulations
TYPE OF METRIC ACTIVITY (IF ANY)	☐	☐	■	☐	■

OTHER Review of federal initiatives

Education

	None	Yes
FORMAL METRIC POLICY?	■	☐

OTHER COMMENTS

SUMMARY

GOVERNMENT - STATE AND LOCAL GOVERNMENTS

1. Summary

Metric activity at the state and local level is low to nonexistent. There has been little change in the status of activity since the demise of the U.S. Metric Board. The National Conference on State Metrication acts as a dissemination and response network for Federal initiatives on metric. The National Conference on Weights and Measures monitors the regulatory status of metric in the states and identifies obstacles to conversion. State level metric activity would be involved with gasoline pricing, international trade and/or highway sign markings. While activity may increase as a result of growing interest in promoting international trade, there is little prospect for extensive metric activity at the state level. There is no political constituency for metric conversion.

2. Agency Covered

The 50 state governments and thousands of local and regional governments have extensive responsibilities for promoting and regulating intrastate trade. Most involvement in metric issues at the state and local level occurs in weights and measures, especially at the retail level. There are two major organizations related to metric at the state and local levels. The National Conference on State Metrication (NCSM), set up by the U.S. Metric Board, is composed of officials appointed by the 50 states as the key contact people on metric issues. These are referred to as the state metric coordinators. The National Conference on Weights and Measures (NCWM), an organization of Federal, state, and local weights and measures officials and private sector representatives, works to ensure that state laws on weights and measures are uniform.

3. Current Status

- o Little has changed since the U.S. Metric Board (USMB) summarized state and local activity in its final report. (See following pages) Education remains the primary activity. Some states are also involved in surveying private sector activity, providing state aid for employee training in metric, and developing data sources on metric activity.
- o The NCSM acts as a dissemination and response network for Federal initiatives regarding metric. For example, the proposed change in Federal standardization policy to accept metric was sent to the NCSM for comment.
- o Of the 22-state metric committees set up in the late 1970's only a few -- Florida, California, Nevada, Texas -- are still active. All are voluntary; none are funded by state governments. However, all 50 states have designated specific departments or individuals to coordinate metric activity.

- On the regulatory side, a recent survey by the NCWM found six states - Florida, West Virginia, New York, California, Indiana, Missouri - would not allow metric-only labeling because of a conflict with state law (N.Y., Florida) or with state policy.
- Procurement at the state level is not likely to be metric. Like the Federal Government, the states procure on the basis of availability of products in the marketplace.

4. Prospects for Conversion

Pressures for greater uniformity in state laws and the growing desire to attract international business will increase the interest of the states in metric. However, these are unlikely to create significantly greater metric activity. Most activity will remain in providing metric education. For the most part, the existing NCSM and NCWM networks will be used to respond to the metric initiatives of the Federal Government and of industry.

5. Sources

The Office of Metric Programs of the Department of Commerce is the secretariat for the NCSM. They would be the most efficient source of information on activity at the state and local level. The NCWM is the best source on laws and regulations regarding measurement in the states.

State Metric Status:

State	State Metric Policy		State Government Metric Activity		State Mechanisms for Coordination			Conversion Activity within State Government			Conversion Activity with the Private Sector			Public Education			
	1. Has policy. 2. Has no policy.		1. Executive activity. 2. Legislative activity.		1. Departmental designee responsible. 2. Committees with State Government only representation. 3. Committees with Public, Private, and Government representation.			1. Gasoline pumps 2. International trade. 3. Highways			1. Surveys of private-sector metrication. 2. State aid and private-sector employee training. 3. Data sources for private sector.			1. State mandate for metric activity 2. Grant monies 3. Metric workshops/training 4. Teaching of metric.			
	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2	3	4
Alabama		X		X	X			X				X		X	X	X	X
Alaska					X			X									
Arizona		X		X	X			X		X				X	X	X	X
Arkansas	X				X			X	X						X	X	X
California	X			X	X		X	X	X	X	X	X	X	X	X	X	X
Colorado		X	X		X		X	X	X						X	X	X
Connecticut	X		X		X		X	X		X				X		X	X
Delaware		X		X	X			X					X	X	X	X	X
Florida	X		X	X	X		X	X	X	X	X			X	X	X	X
Georgia		X			X		X	X	X								
Hawaii	X		X	X	X		X	X			X			X	X	X	X
Idaho					X			X									
Illinois					X			X									
Indiana		X			X			X									
Iowa	X				X			X							X	X	X
Kansas		X			X			X	X	X			X		X	X	X
Kentucky		X			X			X									
Louisiana	X		X		X			X				X		X	X	X	X
Maine		X	X		X	X		X						X	X	X	X
Maryland	X		X	X	X			X	X	X				X	X		X
Massachusetts		X		X	X			X		X					X	X	X
Michigan	X				X			X					X	X	X	X	X
Minnesota	X			X	X			X						X	X	X	X
Mississippi		X		X	X			X	X		X			X	X	X	X
Missouri	X				X	X		X				X	X		X	X	X

State Metric Status:

State	State Metric Policy		State Government Metric Activity		State Mechanisms for Coordination			Conversion Activity within State Government			Conversion Activity with the Private Sector			Public Education			
	1 Has policy. 2 Has no policy.		1 Executive activity. 2 Legislative activity.		1 Departmental designee responsible. 2. Committees with State Government only representation. 3 Committees with Public, Private, and Government representation.			1 Gasoline pumps. 2 International trade 3 Highways.			1 Surveys of private-sector metrication 2 State aid and private-sector employee training. 3. Data sources for private sector.			1 State mandate for metric activity 2 Grant monies. 3 Metric workshops/training. 4 Teaching of metric			
	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2	3	4
Montana	X		X	X	X	X		X						X	X	X	X
Nebraska		X		X	X			X	X		X	X		X	X	X	X
Nevada	X		X	X	X		X	X								X	X
New Hampshire				X				X									
New Jersey					X			X								X	X
New Mexico		X	X	X	X			X						X		X	X
New York	X		X	X	X	X		X							X	X	X
North Carolina		X	X		X	X		X						X		X	X
North Dakota	X			X	X			X							X	X	X
Ohio		X		X	X			X		X				X	X	X	X
Oklahoma					X			X									
Oregon		X	X		X	X		X		X	X	X		X	X	X	X
Pennsylvania		X		X	X			X							X		
Rhode Island		X			X			X						X		X	X
South Carolina	X			X	X		X	X				X		X	X	X	
South Dakota		X		X	X			X		X					X	X	X
Tennessee		X	X		X		X	X							X	X	X
Texas	X			X	X		X	X		X		X		X	X	X	X
Utah					X			X									
Vermont	X				X		X	X		X				X	X	X	X
Virginia		X		X	X			X				X		X	X	X	X
Washington		X	X		X	X		X		X	X	X			X	X	X
West Virginia		X		X	X			X				X		X	X	X	X
Wisconsin					X			X									
Wyoming					X			X									

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DIAGNOSIS OF METRIC SITUATION

AGENCY: TENNESSEE VALLEY AUTHORITY

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION	■				

TYPE OF METRIC ACTIVITY (IF ANY)

☒ Planning
☐ Standards
☒ Procurement
☒ Press Releases
☐ Regulation

OTHER ______________________________

FORMAL METRIC POLICY? ☐ None ☒ Yes

OTHER COMMENTS

SUMMARY

GOVERNMENT: TENNESSEE VALLEY AUTHORITY

1. Summary

Metric activity is very low at the Tennessee Valley Authority (TVA). Multiple reorganizations and a wait and see policy have left the agency little further than it was 5 years ago. TVA procures many products. Where available, such as in the nuclear area, it buys in metric units. However, very little of its procurement is metric. There is little momentum for conversion within TVA.

2. Agency Covered

The Tennessee Valley Authority (TVA) is a government-owned corporation that conducts a unified program of resource development for the advancement of economic growth in the Tennessee Valley region. The Authority's program of activities includes flood control, navigation development, electric power production, fertilizer development, recreation improvement, and forestry and wildlife development. While its power program is financially self-supporting, other programs are financed primarily by appropriations from Congress.

3. Current Status

- There is a TVA metric policy, a metric coordinator and a metric committee. However, metric is a very low priority issue in TVA.
- TVA press releases rarely contain measurement sensitive items. The federal resolution is adhered to by TVA but there are few opportunities to follow it.
- Procurement and associated standards are largely in customary units. In areas such as medicine and nuclear engineering, standards and publications use metric measurements.
- There are no barriers to the use of metric measurements resulting from TVA regulations or specifications. The subject is rarely mentioned by TVA engineers or contracting companies.
- The general approach of the TVA is not to lead or to lag but to keep up with the actions of industry and the rest of the Federal Government.

4. Prospects for Conversion

The prospects for conversion in TVA are dim. There is little constituency within or outside TVA pressing for conversions.

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DIAGNOSIS OF METRIC SITUATION

AGENCY: DEPARTMENT OF TRANSPORTATION

		NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT:	CURRENT METRIC ACTIVITY		■			
PAST:	METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE:	METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
	MOMENTUM OF CONVERSION		■			

	Planning	Standards	Procurement	Press Releases	Regulation
TYPE OF METRIC ACTIVITY (IF ANY)	■	☐	☐	■	☐

OTHER ______________________

____

FORMAL METRIC POLICY? None ☐ Yes ■

OTHER COMMENTS

SUMMARY

GOVERNMENT: DEPARTMENT OF TRANSPORTATION (DOT)

1. Summary

Very little metric activity is reported in the Department of Transportation. In the late 1970's, DOT made a concerted effort, together with a number of States, to convert road distance and speed signs as had been done in Canada. Given the intense adverse public comments that resulted, Congress passed a law which prohibited the use of Federal funds for erecting metric-only signs and stated that customary units must be prominent on Federally funded signs. Since that time, very little has been done although State and Federal agencies appear to be ready to convert whenever requested. Some activity is reported in aeronautics and marine sections. DOT is very active with the ANMC committee on aeronautics and aviation. The FAA has developed plans for converting to metric when and if that industry decides to convert. The St. Lawrence Seaway administrators are apparently completely converted due in part to the necessity of coordinating their activities with Canada. DOT resisted international efforts to require the metrication of containers due to the large number of customary-sized containers still in use. Metric tariffs are now in place and available for those who wish to use them.

2. Agency Covered

The U.S. Department of Transporation (DOT) establishes the Nation's overall tranportation policy. Under its umbrella there are eight administrations whose juridictions include highway planning, development, and construction; urban mass transit; railroads; aviation; and the safety of waterways, ports, highways, and oil and gas pipelines. Decisions made by DOT in conjunction with the appropriate State and local officials strongly affect other programs such as land planning, energy conservation, scarce resource utilization, and technological change.

3. Current Status

- Little activity overall. DOT is essentially waiting for the private sector to convert. It views its mandate as one of serving rather than leading, and of removing whatever barriers are identified. There is a formal metric policy in place as well as a metric coordinator and an agency metrication committee.
- The agencies' internal directives or procedures do not specify the use of metric but, upon request, will use dual units.

- o Except for the Congressional act of the late 1970's, there do not appear to be any regulations inhibiting the use of metric. A possible exception is in aviation where traffic controllers may not be allowed to use metric due to possible safety hazards. DOT has developed safety standards for use with new metric automobile parts and tires.
- o No significant consumer complaints have been identified. The Department no longer has a consumer affairs section because they have few dealings with direct consumers.
- o Metric policy with regard to press releases follows the USMB's requirements. In effect, both systems are used "where appropriate".
- o In procurement, DOT follows the GSA regulations governing all procurements. Industrial/GSA standards are maintained and used.
- o FAA is active on the ANMC aeronautical committee. No longer is it active on the construction committee.
- o DOT is not involved in any planned activity to develop metrication with State or local governments.
- o The Federal Highway Administration's publication Public Roads has, for the past seven years, put metric measurements first and customary measurements second. In September 1983, they went back to putting customary measurements first.

4. Prospects for Conversion

The Department of Transportation will convert as the industries it serves convert. It depends on the economy (market demand), international trade, and developments in scientific and technological research requiring technological transfer to industry. A key indicator in the aviation area is conversion of military aviation standards upon which FAA procedures are based. In aviation operations the growing use of the ICAO Rules and Procedures in international flight operations will increase the role of metric in air operations. DOT will work to ensure that its regulations do not impede the progress of metrication.

DIAGNOSIS OF METRIC SITUATION

AGENCY: VETERANS ADMINISTRATION

	NONE	LOW	MEDIUM	HIGH	DO NOT KNOW
PRESENT: CURRENT METRIC ACTIVITY		■			
PAST: METRIC ACTIVITY DURING THE PAST FIVE YEARS		■			
FUTURE: METRIC ACTIVITY DURING THE NEXT FIVE YEARS		■			
MOMENTUM OF CONVERSION		■			

TYPE OF METRIC ACTIVITY (IF ANY)

Planning	Standards	Procurement	Press Releases	Regulations
☐	☒	☒	☒	☐

OTHER ______________________

FORMAL METRIC POLICY? None ☐ Yes ☒

OTHER COMMENTS

The VA will follow industry's lead on metric conversion.

SUMMARY

GOVERNMENT: VETERANS ADMINISTRATION (VA)

1. Summary

The Veterans Administration has converted to metric on an as-needed basis. The VA builds and maintains hospitals and purchases medical and other supplies for those hospitals. The VA also supports research in medicine and other related areas. When it authorizes construction it rarely uses metric. The VA is following the proposed Federal guidelines for identifying and removing barriers to metric procurement. However, the VA will not lead in the buying or developing of metric products. It will follow industry's lead. Metric conversion in the VA will remain pretty much the way it is unless metric becomes more prevalent in the marketplace--especially the construction industry.

2. Agency Covered

A thorough system of benefits for veterans and dependents is administered by the Veterans Administration (VA). These benefits include compensation payments for disabilities or death related to military service; pension based on financial need for totally disabled veterans or certain survivors for disabilities or death not related to military service; education and rehabilitation; home loan guaranty; burial, including cemetaries, markers, flags, etc.; and a comprehensive medical program involving a widespread system of nursing homes, clinics, and more than 170 medical centers.

3. Current Status

- The VA has a metric coordinator and a metric policy was signed in 1981. The metric policy generally follows the Federal guidelines for metric conversion plans.
- VA personnel participate on the ANMC construction committees.
- The VA follows the ICMP resolution on the use of metric in press releases. However, there are very few occasions when measurement is used in press releases.
- Procurement is the central area of metric activity in VA. The VA builds, runs, supplies, and maintains hospitals and associated services. It develops its own specifications and uses Federal, military, and private industry specifications. Most of the VA specifications are oriented toward performance rather than design. As a result, VA specifications tend to be less measurement-sensitive than military specifications.
- Where metric is the prevalent measurement system for the industry--such as in medicine and lab equipment--

they will buy in metric. The VA prefers to use commercially available products.

- The VA reviews their specifications every five years in accordance with Federal regulations. They will be taking a look at whether or not their specifications inhibit the use of metric according to the new policy on removing barriers to metric procurement. They do not believe that they will find any barriers, either in construction, or in general supplies.

4. Prospects for Conversion

The VA will convert to metric when and if industries working with VA convert to metric. They already buy metric products from medical supply firms. If the construction industry converts to metric they will use metric construction. The VA will not be a force for conversion to metric in industry. However, they will not put up barriers to industry conversion.

APPENDICES C - G

DOCUMENTS

APPENDIX C	TRADE ASSOCIATION/TRADE JOURNAL SCAN INTERVIEW FORM
APPENDIX D	TRADE ASSOCIATION/TRADE JOURNAL IN-DEPTH INTERVIEW FORM
APPENDIX E	COMPANIES - IN-DEPTH INTERVIEW FORM
APPENDIX F	GOVERNMENT AGENCY INTERVIEW FORM
APPENDIX G	ATTACHMENTS RELATED TO GOVERNMENT METRIC ACTIVITY

- MOC Meeting, January 18, 1983, Minutes
- Organization Chart of ICMP
- DOC News Release, September 26, 1983
- ICMP Annual Report, 1982
- ICMP Annual Report, 1981
- DOD Directive 4120.18, January 1, 1980
- DOD Directive 4120.23, May 18, 1981
- Proposed Rule on the Use of the Metric System in Federal Standardization Documents
- Preferred Metric Units for General Use by the Federal Government, GSA, May 5, 1983

Y8-MON-1984123(APP.C-G);E;C

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APPENDIX C

TRADE ASSOCIATION/TRADE JOURNAL SCAN INTERVIEW FORM

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

INTERVIEW NO.________________

INDUSTRY GROUP________________

TRADE ASSOCIATION/TRADE JOURNAL

Respondent________________	Caller________________
Title________________	Date________________
Organization________________	Referred by________________
Phone No.________________	

Consultation Report

Hello. My name is ____________________. I'm with J.F. Coates, Inc., a policy research firm in Washington, D.C. We are doing a study on The Status of Metric Conversion in U.S. Industry for Metric Commission - Canada. As part of that project we are seeking the ideas of experts and concerned parties such as you.

I have several topics I'd like to discuss with you about the Status of Metric Conversion. Whatever you say will be used without attribution. Metric Commission - Canada will issue a summary around the end of the year.

Would you like a copy? Yes No

Before we go on could I get your full name and correct title and address?

____

____

____

____

____

INSTRUCTIONS TO INTERVIEWERS:

Use DK if they do not know or will not answer.

Write down any explanations given.

See sheet of reasons why Metric Commission - Canada is interested in U.S. conversion.

Press for numbers, percentages, ranges where possible.

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

INTERVIEW NO ________

INDUSTRY GROUP ____________________

SCREENING QUESTIONS

1. Can you tell me about your association/journal and the industry/profession it covers? (Ask for a brief pamphlet/leaflet/other description to be sent)

2. Has there been any metric activity in your industry / profession? If so what and when? (Ask if the association has a policy statement on metric, if so, have it sent)

3. Is there likely to be any metric activity in your industry/profession? If so, what and when?

4. If YES to 2 or 3, Are you the person I should talk with about metric in your industry/profession?

If YES. tell the person we are doing an initial scan of the area and that we may be back in touch with some more specific quesitons on metric in their industry/profession.

5. Are there other associations or journals we should contact about metric as it relates to your industry/profession?

Review what the person is sending

1.

2.

3.

APPENDIX D

TRADE ASSOCIATION/TRADE JOURNAL IN-DEPTH INTERVIEW FORM

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

INTERVIEW NO.________________
INDUSTRY GROUP________________

TRADE ASSOCIATION/TRADE JOURNAL

Respondent________________	Caller________________
Title________________	Date________________
Organization________________	Referred by________________
Phone No.________________	

Consultation Report

Hello. My name is ____________________. I'm with J.F. Coates, Inc., a policy research firm in Washington, D.C. We are doing a study on The Status of Metric Conversion in U.S. Industry for Metric Commission - Canada. As part of that project we are seeking the ideas of experts and concerned parties such as you.

I have several topics I'd like to discuss with you about the Status of Metric Conversion. Whatever you say will be used without attribution. Metric Commission - Canada will issue a summary around the end of the year.

Would you like a copy? Yes No

Before we go on could I get your full name and correct title and address?

____

____

____

____

____

INSTRUCTIONS TO INTERVIEWERS:

1. Keep it to a half an hour.
2. Use DK if they do not know or will not answer.
3. Write down any explanations given.
4. See sheet of reasons why Metric Commission - Canada is interested in U.S. conversion.
5. Press for numbers, percentages, ranges where possible.

INTERVIEW NO. ________
INDUSTRY GROUP ________

FULL INTERVIEW

PRODUCTS

2. What are the top selling products in your industry? (get the top 5 and their share of overall industry sales)

3. Do you have a feel for how much of your industry's production is substantially metric?

Press for a range

Note down what they say

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

None A little Some Most All

If no products are metric, skip to Question 5

Substantially metric means that conversion has gone far enough that management is unlikely to change the product to customary.

4. Which producst are substantially metric?

If no products mentioned, skip to Question 5

4a. How much (in terms of percent of sales) of their Domestic U.S. markets have these metric products captured?

4b. Does the sales literature for the products in your industry use metric dimensions?

4c. How long have these products been made in metric sizes?

4d. Why is the industry converting these products to metric sizes?

Foreign competition ______
Export market ______
New technology ______
Customer demands ______
New product ______
Other ______

4e. How was the conversion done?

Industry plan ______
Foreign Firm ______
Leading Company ______
New entrant to industry ______
Other ______

TYPES OF FIRMS

5. How would you describe the structure of your industry? What different types of firms comprise your industry - multinationals, conglomerates, multiple product line, single product line, specialty items?

Types of Firms	Who are some leading firms in each of these types of firms?

6. How much of the industry does your association/journal cover?

7. Which types of firms are most likely to market metric products? Why?

8. Why are some firms not marketing metric products?

9. Do firms in your industry who produce for foreign markets make metric products? If so, are these products made in the U.S. and exported or made in foreign facilities?

9a. (If yes to 9) What about Canada?

STANDARDS

10. Does your industry use any hard metric standards?

11. What are the main standards writing organizations for your industry?

12. Are standards writing organizations working on hard metric standards for your industry?

13. Are your industry's standards soft converted? (that is designed in customary units and labelled in customary and metric units?)

14. Are ISO-IEC standards or foreign standards used by your industry to any significant extent?

STATUS AND PLANNING

15. Have there been recent surveys - within the last 3 years - of the use of metric measurements in your industry? If so, how can we get a copy of the results?

16. Has your industry done any industry-wide metric planning?

17. Do many companies in your industry have policies to convert to metric?

18. Do you think your industry will do industry-wide metric planning in the future? If so, why and when?

19. Do you think more companies in your industry will adopt metric policies in the future? If so, why and when?

20. Are there some companies in your industry who have been leaders in metric conversion? If so, who and what have they done?

21. When a company in your industry converts to metric, how does it usually go about it?

Product line by product line ______
Facility by facility ______
Division by division ______
Ad hoc ______
All at once ______
Other ______

22. Are there some companies who are leading opponents to metric conversion? If so, which companies and what have they done?

FUTURE

23. What existing products do you think are most likely to be substantially metric in the future? When will they be substantially metric?

Products	When converted

24. Are any new products coming onto the market over the next 5 years likely to be substantially metric? Which and why?

25. Is your industry providing metric education to:

    Employees?
    Suppliers?
    Customers?
    Public?
    Member firms or readers?

26. Has labor influenced metric conversion in your industry to any significant degree, pro or con?

Training ______
Labor negotiations ______
Tool purchasing ______
Educating members ______
Organizing opposition to metric ______
Other ______

27. In general, what forces do you see promoting the use of metric in your industry?

Replacing machinery ______
Availability of metric capable machinery ______
Technological developments ______
Use of foreign machinery ______
Foreign production in the U.S. ______
Growing U.S. interest in export markets ______
Growing imports of metric products ______
Other ______

28. What forces do you see inhibiting metric use in your industry?

Large U.S. market ______
Customer resistance ______
Foreign market unimportant ______
Lack of accepted standards ______
Industry resistance ______
Labor resistance ______
Other ______

29. By what year will 50% of your industry's products be made to hard metric sizes? __________

30. By 1995, what percent of your industry's products will be made to hard metric sizes? __________

31. Is there anything that could drastically alter the outlook for metric use in your industry?

32. Are there major unresolved questions, problems, or concerns about metric use in your industry?

OTHER CONTACTS

33. Who else should we talk to about metric in your industry?

Other associations

Other journals

Government agencies and officials

Companies (press for specific people)

Other observers

34. Are there publications or documents that can give us an overview of your industry and its performance?

35. Are there any publications that describe the use of metric in your industry?

36. Is there anything else you would like to tell us about the use of metric in your industry?

Thank you for your help. Should there be any reason to contact me, I can be reached at (202) 966-9307.

APPENDIX E

COMPANIES -- IN-DEPTH INTERVIEW FORM

LONG FORM

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

INTERVIEW NO.________________

INDUSTRY GROUP________________

COMPANIES

Respondent________________ Caller________________

Title________________ Date________________

Organization________________ Referred by________________

Phone No.________________

Consultation Report

Hello. My name is ____________________. I'm with J.F. Coates, Inc., a policy research firm in Washington, D.C. We are doing a study on The Status of Metric Conversion in U.S. Industry for Metric Commission - Canada. As part of that project we are seeking the ideas of experts and concerned parties such as you.

I have several topics I'd like to discuss with you about the Status of Metric Conversion. Whatever you say will be used without attribution. Metric Commission - Canada will issue a summary around the end of the year.

Would you like a copy? Yes No

Before we go on could I get your full name and correct title and address?

____

____

____

____

____

INSTRUCTIONS TO INTERVIEWERS:

1. Keep it to a half an hour.
2. Use DK if they do not know or will not answer.
3. Write down any explanations given.
4. See sheet of reasons why Metric Commission - Canada is interested in U.S. conversion.
5. Press for numbers, percentages, ranges where possible.

PRODUCTS

3. What are the top selling products in your company? (get the top 5 and their share of overall company sales)

3a. Do you have a feel for how much of your company's production is substantially metric?

Press for a range

Note down what they say

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
None		A little			Some		Most			All

If no products are metric, skip to Question 5

Substantially metric means that conversion has gone far enough that management is unlikely to change the product to customary.

4. Which of your company's products are substantially metric?

If no products mentioned, skip to Question 5

4a. How much (in terms of percent of sales) of their Domestic U.S. markets have these metric products captured?

4b. Does the sales literature for the products in your company use metric dimensions?

4c. How long have these products been made in metric sizes?

4d. Why is the company converting these products to metric sizes?

Foreign competition ______
Export market ______
New technology ______
Customer demands ______
New product ______
Other ______

4e. How was the conversion done?

Product line by product line ______
Facility by facility ______
Division by division ______
Ad hoc ______
All at once ______
Other ______

4f. Does your company have a metric policy? If so, what is it?
(try to get a copy sent)

5. Do you sell to foreign markets? If yes, do you sell metric products to these markets? If so, are these products made in the U.S. and exported or made in foreign facilities?

What about selling to Canada?

STANDARDS

6. Does your company use any hard metric standards?

7.. What are the main standards writing organizations for your industry?

8. Are standards writing organizations working on hard metric standards for your industry?

9. Are your industry's standards soft converted? (that is designed in customary units and labelled in customary and metric units?)

10. Are ISO-IEC standards or foreign standards used by your company to any significant extent?

FUTURE

11. What existing products do you think are most likely to be substantially metric in the future? When will they be substantially metric?

Products	When converted

12. Are any new products coming onto the market over the next 5 years likely to be substantially metric? Which and why?

13. Is your company providing metric education to:
    - Employees?
    - Suppliers?
    - Customers?
    - Public?

14. Has labor influenced metric conversion in your company/ to any significant degree, pro or con?

Training ______
Labor negotiations ______
Tool purchasing ______
Educating members ______
Organizing opposition to metric ______
Other ______

15. In general, what forces do you see promoting the use of metric in your company

Replacing machinery ______
Availability of metric capable machinery ______
Technological developments ______
Use of foreign machinery ______
Foreign production in the U.S. ______
Growing U.S. interest in export markets ______
Growing imports of metric products ______
Other ______

16. What forces do you see inhibiting metric use in your company?

Large U.S. market	_____
Customer resistance	_____
Foreign market unimportant	_____
Lack of accepted standards	_____
Industry resistance	_____
Labor resistance	_____
Other	_____

17. By what year will 50% of your company's products be made to hard metric sizes? __________

18. By 1995, what percent of your company's products will be made to hard metric sizes? __________

19. Is there anything that could drastically alter the outlook for metric use in your company?

20. Are there major unresolved questions, problems, or concerns about metric use in your company?

INDUSTRY (Optional)

I have a few questions I'd like to ask you about the role of metric in your industry as a whole;could you talk to me about the use of metric in your industry?

_____ Yes

IF YES, proceed with
the following questions

_____ No

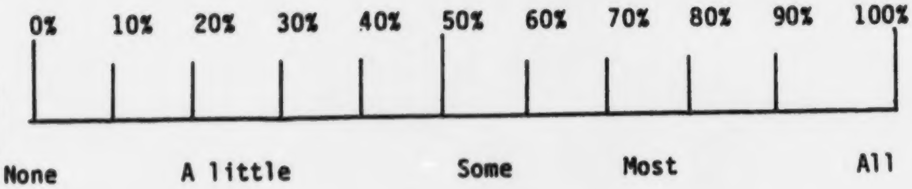
IF NO, skip to
question 31.

21. What are the top selling products in your industry? (get the top 5 and their share of overall industry sales)

22. Do you have a feel for how much of your industry's production is substantially metric?

Press for a range

Note down what they say



If no products are metric, skip to Question 5

Substantially metric means that conversion has gone far enough that management is unlikely to change the product to customary.

23. Have there been recent surveys - within the last 3 years - of the use of metric measurements in your industry? If so, how can we get a copy of the results?

24. Has your industry done any industry-wide metric planning?

25. Do many companies in your industry have policies to convert to metric?

26. Do you think your industry will do industry-wide metric planning in the future? If so, why and when?

27. Do you think more companies in your industry will adopt metric policies in the future? If so, why and when?

28. Are there some companies in your industry who have been leaders in metric conversion? If so, who and what have they done?

29. When a company in your industry converts to metric, how does it usually go about it?

Product line by product line ______
Facility by facility ______
Division by division ______
Ad hoc ______
All at once ______
Other ______

30. Are there some companies who are leading opponents to metric conversion? If so, which companies and what have they done?

OTHER CONTACTS

31. Who else should we talk to about metric in your industry?

Other associations

Other journals

Government agencies and officials

Companies (press for specific people)

Other observers

32. Are there publications or documents that can give us an overview of your industry and its performance?

33. Are there any publications that describe the use of metric in your industry?

34. Is there anything else you would like to tell us about the use of metric in your industry?

Thank you for your help. Should there be any reason to contact me, I can be reached at (202) 966-9307.

APPENDIX F

GOVERNMENT AGENCY INTERVIEW FORM

JFCOATES INC.
3738 KANAWHA STREET, N.W. WASHINGTON, D.C. 20015

INTERVIEW NO. ______________

AGENCY ______________

GOVERNMENT AGENCY

Respondent ______________

Title ______________

Organization ______________

Phone No. ______________

Caller ______________

Date ______________

Referred by ______________

Consultation Report

Hello. My name is ______________. I'm with J.F. Coates, Inc., a policy research firm in Washington, D.C. We are doing a study on The Status of Metric Conversion in U.S. Industry for Metric Commission - Canada. As part of that project we are seeking the ideas of experts and concerned parties such as you.

I have several topics I'd like to discuss with you about the Status of Metric Conversion. Whatever you say will be used without attribution. Metric Commission - Canada will issue a summary around the end of the year.

Would you like a copy? Yes No

Before we go on could I get your full name and correct title and address?

____

____

____

____

____

INSTRUCTIONS TO INTERVIEWERS:

Use DK if they do not know or will not answer.

Write down any explanations given.

See sheet of reasons why Metric Commission - Canada is interested in U.S. conversion.

Press for numbers, percentages, ranges where possible.

INTERVIEW NO ____________________

JFCOATES Inc.
1738 KANAWHA STREET N.W.   WASHINGTON D.C. 20015

AGENCY ____________________

1. Has there been any metric activity in your agency? If so, what and when?

(When the discussion begins to wind down, ask the following probe questions)

1a Do your agencies internal directives or procedures specify the use of metric measurements? (if DK ask who would know - who runs the directive system for the agency)

1b Do your agency's regulations, rules, and other documents use metric measurements? (If DK ask who - especially in the General Counsel's office would know)

Do your agency's rules and regulations prohibit, inhibit, or otherwise work against the use of metric measurment?

1c Have there been any consumer complaints or concerns voiced to your agency about metric? (If DK ask who in Consumer Affairs would know)

1d Does your agency have a metric policy regarding public information (if DK, ask who to talk to in public information or public affairs)

1e Does your agency have a policy on use of metric in public relations or press releases (If DK, ask who in public relations would know)

1f Does your agency use metric measurement when it purchases products or services from the private sector? (If DK, ask who in Procurement would know)

1g Is your agency involved in private sector metric planning activities-ANMC, metric standards writing, or other activities? (If DK, ask who might know)

1h Is your agency involved in any metric activity or planning involving state or local governments? (If DK, ask who would know)

1i Have metric issues or concerns come up in your relations with Congress? (If DK ask who in Congressional Relations might know)

2. Is there likely to be any activity in your agency on metric in the near future?

(After the general comments, probe the following)

Internal directives

Regulations

Consumer relations

Public information

Public Relations

Procurement

Private Sector Activity

Congressional Relations

3. Who else in your agency should we talk with about metric?

4. Are there people in other agencies we should talk with to get a better feel for what is happening in the Government regarding metric?

5. Are there people we should talk with in state or local government about metric activity at the state or local level?

6. Is there anything else you would like to add?

APPENDIX G

ATTACHMENTS RELATED TO GOVERNMENT METRIC ACTIVITY

1. Minutes of Meeting, Metrication Operating Committee (MOC), Interagency Committee on Metric Policy (ICMP), January 18, 1983.

2. Organization Chart of the ICMP as of September 1, 1983.

3. News Release, Department of Commerce, 9/26/83.

4. 1982 Annual Report, Interagency Committee on Metric Policy.

5. 1981 Annual Report, Interagency Committee on Metric Policy.

6. Department of Defense (DOD) Directive 4120.18, January 28, 1980.

7. Department of Defense (DOD) Directive 4120.23, May 18, 1981.

8. Proposed Rule on the Use of Metric System in Federal Standardization Documents.

9. Preferred Metric Units for General Use by the Federal Government, General Services Administration, May 5, 1983.

APPENDIX G.1

MINUTES OF MEETING, METRICATION OPERATING COMMITTEE (MOC), INTER-AGENCY COMMITTEE ON METRIC POLICY (ICMP), JANUARY 18, 1983

4

Unconfirmed

MINUTES OF MEETING
METRICATION OPERATING COMMITTEE (MOC)
INTERAGENCY COMMITTEE ON METRIC POLICY (ICMP)

January 18, 1983

There were 29 attendees from 21 Departments and Agencies. Also present were the following:

1. Dr. D. Bruce Merrifield, Assistant Secretary for Productivity, Technology and Innovation in the Department of Commerce, and new Chairman of the ICMP
2. Mr. Carl A. Beck, Chairman of the Government Liaison Committee, American National Metric Council (ANMC)
3. Ms. Cheryl Cummins, Vice President, ANMC
4. Mr. Hollis B. Vail, Former Department of Interior Metric Coordinator.

Attached is a list of attendees. Mr. Ellsworth introduced himself and asked each attendee to identify himself or herself. The minutes of the May 13, 1982, meeting were confirmed as submitted. The agenda for the meeting was accepted as submitted with the addition of a discussion on a survey of agencies of a revised Federal Metric Status Report.

Remarks by Dr. Merrifield

Dr. Merrifield welcomed the attendees and gave several remarks. He said he has long worked in the metric system and it "is astonishing that the U.S. has not moved faster to metric." The pressure for increased metric usage is becoming irresistable because:

1. The U.S. is participating more and more in world markets. For example, China will be in metric and plans to be at the leading edge of technology by the year 2000. The U.S. wants to establish a good trading relationship with China. The U.S. cannot effectively compete unless it is in metric.
2. More and more of the world's technology is being developed outside the United States, i.e., in metric units. Only 20 years ago, the U. S. generated about 75 percent of the world technology; now it is 50 percent; in 10 years it will be about 30 percent.

3. Explosion of technology is making existing facilities obsolete at a faster and faster rate. The resulting accelerated replacement will lead to greater use of metric units.

The Department of Commerce wants to focus on opportunities that can result from metric conversion. He stated that the MOC has a real opportunity to be of service to the country by planning and coordinating metric conversion within Federal activities.

Finally, Dr. Merrifield presented a Department of Commerce Certificate of Appreciation to Mr. Ellsworth because of his retirement at the end of January. The Certificate, signed by Dr. Merrifield, read:

> in recognition of his leadership within the Federal Government on all aspects of the United States metric program, his service as Chairman of the Metrication Operating Committee, and his serving as an eloquent spokesman on the advantages to be derived from conversion to the metric system.

Chairman's Report

Mr. Ellsworth reviewed events of interest to the MOC which have taken place since the May 13 meeting.

1. Perhaps the most important event was the transfer of the Federal metric conversion focal point from the U.S. Metric Board to the new Office of Metric Programs in the Department of Commerce. The Metric Board was not funded after September 30 and the Secretary of Commerce continued to undertake the Federal metrication duties as provided in the Joint Resolution of Congress. The Department of Commerce is investigating the formal continuation of the ICMP.

2. Stan Parent, Deputy Executive Director of the U.S. Metric Board, presented the U.S. Metric Board's 9 Findings and 6 Recommendations in its Final Summary Report at the May 13 MOC meeting. Since that meeting, the MOC Executive Board developed a statement based on comments from the full MOC membership on these Findings and Recommendations from a Federal agency perspective. With regard to the Findings, the MOC felt that they were basically consistent with the aggregate experience gained by the federal agencies. The MOC felt that

the Findings will minimize most of the fears and misconceptions about the problems and costs of metrication. The MOC generally supported the Board's Recommendations. These comments as well as the future of the MOC as perceived by the MOC were reported by the MOC Chairman to the Board at its July 8, 1982, meeting. Basically, he reported to the Board that the MOC believes that the relationship with the U.S. Metric Board has been beneficial to the MOC; that the MOC should continue in existence; that the MOC intends to continue complying with its charter until it is changed by the ICMP or the Department of Commerce; and that the MOC is developing closer working relationships with the ANMC.

3. The ICMP Probable Worklist for FY83 approved by the MOC at its last meeting was sent to the ICMP by memo dated July 15, 1982. Several of the agenda items of this meeting are from the Probable Worklist:

   a. Revision of the Federal Metric Information Referral Directory

   b. Assistance to agencies in using metric units in press releases

   c. Effect of Federal procurement regulations on metric conversion.

4. The MOC Executive Board has been working with the ANMC staff to achieve a closer working relationship under the new ANMC policy. Basically. the MOC will now closely monitor ANMC's activities and plans and with their (ANMC's) approval, the full MOC and its Executive Board will be as helpful as possible as permitted by law in assuring federal support. There is a desire on the part of both the Executive Board and the MOC to promote resolution of metric issues. As a result, the MOC Executive Board has been examining ways to achieve this better working relationship. One of its suggested solutions is the formation of an Industry Liaison Subcommittee to serve as a liaison between the MOC and private sector metric conversion organizations such as the ANMC.

5. As announced by Dr. Goldman at the last meeting, the MOC formed a task group on productivity, which soon developed an issue paper, "Productivity and Metric Conversion," for the Research, Development and Technological Innovation Subcommittee of the National Productivity Advisory Committee (NPAC). This paper

dealt with the relationship between productivity and metrication and the key issue involved for consideration by the subcommittee. At its October 1, 1982, meeting, the NPAC adopted a resolution on the Role of Government in Metric Conversion. The recently signed Public Law 97-367 establishes a White House Conference on Productivity which would follow up on the old National Productivity Advisory Committee.

6. The Interstate Commerce Commission in a decision dated August 12, 1982, authorized carriers and agents to refer to the ANMC document, "Standard Reference Tables for Metric Conversion of Transportation Tariffs" for conversion of tariffs to metric. Twelve selected MOC agencies had previously reviewed the document.

7. The MOC Executive Board has met with the Federal Contract Specialist of the National Small Business Association to discuss the Association's Bidder Early Alert Message (BEAM) program, which is a small business link to government contracts. Each day, the Federal government publishes a list of everything it is seeking to buy from the private sector in the Commerce Business Daily. The BEAM program matches these requests for bids to the capabilities and interests of each of the BEAM members. The BEAM program asks the relevant agencies to mail bidding documents directly to the BEAM members in order to assist small businesses in getting their bids in on time. Most small businesses, heretofore, have not been involved in bidding for federal contracts because of time constraints, inconvenient availability of specs and documents, and lack of knowledge of the bidding process. The BEAM program is assisting in the foreign trade area of getting bid papers from foreign countries to members. The NSBA offered to channel metric information such as federal metric policy and metric conversion plans to small business members. The Executive Board is now developing material to be distributed to the NSBA membership.

8. The MOC developed Federal Standard 376, "Preferred Metric Units for General Use by Federal Agencies," has been approved and is now awaiting publication.

9. The State of Florida has come to the Federal Department of Transportation with a request to use metric units as well as inch-pound units on some of its highway speed limit signs. Mr. Nupp of the Department of Transportation stated that the Federal Highway Administration has

approved the State's plan for use of dual signing on some of its roads because of the large number of tourists who are used to the metric system. The Federal Highway Administration has asked the State to monitor the effects of dual signing.

10. Finally, Mr. Ellsworth stated that he is leaving the Federal service at the end of January and that Dr. Goldman will serve as Acting Chairman.

Report on the Office of Metric Programs

Dr. Goldman, who is Acting Director of the new Office of Metric Programs in the Department of Commerce, reported that the Office was established on October 1, 1982, with a budget of $300,000. The general role of the Office is to remove barriers to metric conversion. Dr. Goldman described some of the functions of the Office, such as providing services for Federal Government planning and coordination activities. The Office is investigating the limits on the use of metric units under the Fair Packaging and Labeling Act. Much of the Office's early efforts were devoted to removing the public perception that metric conversion is not moving forward caused by the demise of the U.S. Metric Board. Dr. Goldman passed out a Fact Sheet on the new Office (copy attached).

American National Metric Council (ANMC)

Ms. Cummins gave a report on ANMC activities since the last MOC meeting and on planned ANMC activities. With the new policy, the ANMC has become more active. ANMC is publicizing the new tariff book as well as the ICC decision. The ANMC is conducting a survey in cooperation with the National Conference on Weights and Measures of the States to determine the limits on the use of metric units for both consumer and non-consumer products. The ANMC will present to the Department of Commerce a panel presentation on the Fresh Fruits and Vegetables Sector project called Modularization, Utilization, and Metrication on March 16. The U.S. exports large amounts of fresh fruits and vegetables and the sector wants to reduce the number of pallet sizes from 500 to 5. A big productivity gain is anticipated. ANMC has also been in contact with the United States Trade Representative, William E. Brock, for his opinion on whether metric requirements are a non-tariff trade barrier or an unfair trade practice. He is expected to respond in several weeks.

Ms. Cummins stated that ANMC has worked very well with the MOC and "we are putting some old issues to rest." She said the ANMC sector committees welcome more Federal membership.

The ANMC Ninth Annual Conference scheduled for April 25-26 will be co-sponsored by the Department of Commerce. She passed around two ANMC handouts, one on the Conference and the other entitled "1982 Selected Highlights, What ANMC Did for its Members."

Approval of Industry Liaison Subcommittee Charter

Mr. Zabych said he was asked by the Executive Board to chair a small group of MOC members and ANMC staff as well as Mr. Beck to develop a mechanism to improve coordination of issues between the public and private sector. The group decided that the best vehicle would be an MOC Industry Liaison Committee. A copy of a draft Committee Charter was sent to the MOC prior to the meeting for review. Mr. Zabych asked for approval of the Charter and this motion was seconded. Several suggested changes were accepted during the course of the discussion:

a. In Item 4 under Functions, delete the rest of the sentence starting with "need."

b. At the end of the sentence under Membership, add "upon request to the MOC Chairman."

The MOC unanimously approved the Charter with the above two changes.

Revised ICMP and MOC Charters

Dr. Goldman stated that since the ICMP was chartered by the U.S. Metric Board, there is now a need to modify the Charters. The legal counsel in the Department of Commerce is now reviewing proposed changes to the Charters. It is the intent of the Department to continue the present ICMP and MOC structure.

Target Date for Availability of Metric Federal Standards and Purchase Specifications

Mr. Ellsworth and Mr. Zabych developed the case that the lack of Federal standardization documents in metric units does constitute a barrier to voluntary metric conversion. When agency contracting officers get standardization documents in inch-pound modules, that is a barrier even when industry is able and willing to produce in metric. The Department of Defense in the so-called Perry Memorandum established a target date of 1990 for availability of metric standards and specifications documents. There is a need for a statement in the Code of Federal Regulations that federal agencies will develop and insert similar metric language in their procurement regulations in order that the private sector can bid without fear that metric would be rejected. Since it is uncertain at this point what that language should say, the following resolution was offered and seconded to set up a Working Group to develop such language:

METRICATION OPERATING COMMITTEE
RESOLUTION

WHEREAS, the Metrication Operating Committee believes that Federal Metric Standards should be established for the Federal Government's procurement of its goods and services and that the absence thereof constitutes a barrier to voluntary metric conversion.

THEREFORE, Be It Resolved that the Chairman of this Committee appoint a Working Group to:

(1) consider in addition to the present measurement language the establishment of Federal Metric Standards for use by the Federal Departments and Agencies in the procurement of their goods and services, including the insertion of metric language in contract specifications;

(2) consider setting a target date for the inclusion of metric language in the Federal Government's contracts and other procurement documentation; and

(3) collaborate with the General Services Administration to develop and insert metric language in the Federal Procurement Regulations (41 CFR Chapters 1 et seq.).

There was extensive discussion on whether item 2 would make use of metric mandatory in procurement, rather than authorizing metric. To avoid this interpretation, the MOC voted to amend item 2 by inserting after "metric language" and before "in the Federal Government" in the second line the words

> "in addition to or in lieu of the present measurement language."

There was also support for establishment of a target date of 1990 to be compatible with the Department of Defense target date. It was felt that this would allow sufficient time to develop metric language in the Federal standardization documents. This support can be considered by the Working Group mentioned in the Resolution.

The MOC then voted unanimously to pass the Resolution as modified in item 2.

Third ICMP Report

Mr. Tascher passed out copies of the draft Third Report of the Interagency Committee on Metric Policy, which covers the period from May 1, 1981, through September 30, 1982. This Report was developed by the Office of Metric Programs and reviewed by the MOC Executive Board. Mr. Tascher asked that the MOC review the Report and send comments to him by February 18. The Report will then be published.

Revision of Federal Metric Information Referral Directory

Mr. Tascher passed out copies of a draft memorandum on the revision of the Federal Metric Information Referral Directory, to be sent to the MOC from the MOC Chairman. The revision will update the Directory issued in December 1981. The MOC agreed that the memorandum be sent.

Use of Press Release Resolution by ICMP Agencies

The memorandum announcing this meeting requested that MOC members come to the meeting prepared to describe their agencies' experience in using the ICMP "Resolution on the Use of Metric Units in Agency Press Releases" and the supplementary "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units," which went into effect August 7, 1981. One of the items on the ICMP Probable Worklist for FY83 was to provide assistance to Federal agencies in using metric units in press releases. Mr. Ellsworth described the Department of Defense use of metric units in the press releases -- metric units first and inch-pount units second. Mr. Nupp said that the Department of Transportation reached a compromise in that metric units will be used when desirable in its press releases. Since no agency indicated problems with the Resolution, Mr. Ellsworth stated that the policy should not be changed at the present time.

Federal Metric Status Report

Mr. Tascher stated that every two years or so, the MOC has conducted a survey of member agencies to determine the status of metrication within Federal agencies. The last survey was sent out in November 1980. Mr. Tascher passed around copies of a draft memorandum and a draft survey form for review and comment. It was suggested that a question be included about the extent of usage of the Press Release Resolution by the agencies. The survey should also ask for concrete activities the agencies are involved in. The MOC then agreed that the memorandum be sent.

Adjourned

The MOC voted to adjourn the meeting at 11:31 a.m.

Attachment

INTERAGENCY COMMMITTEE ON METRIC POLICY
METRICATION OPERATING COMMITTEE
LIST OF ATTENDEES

January 18, 1983

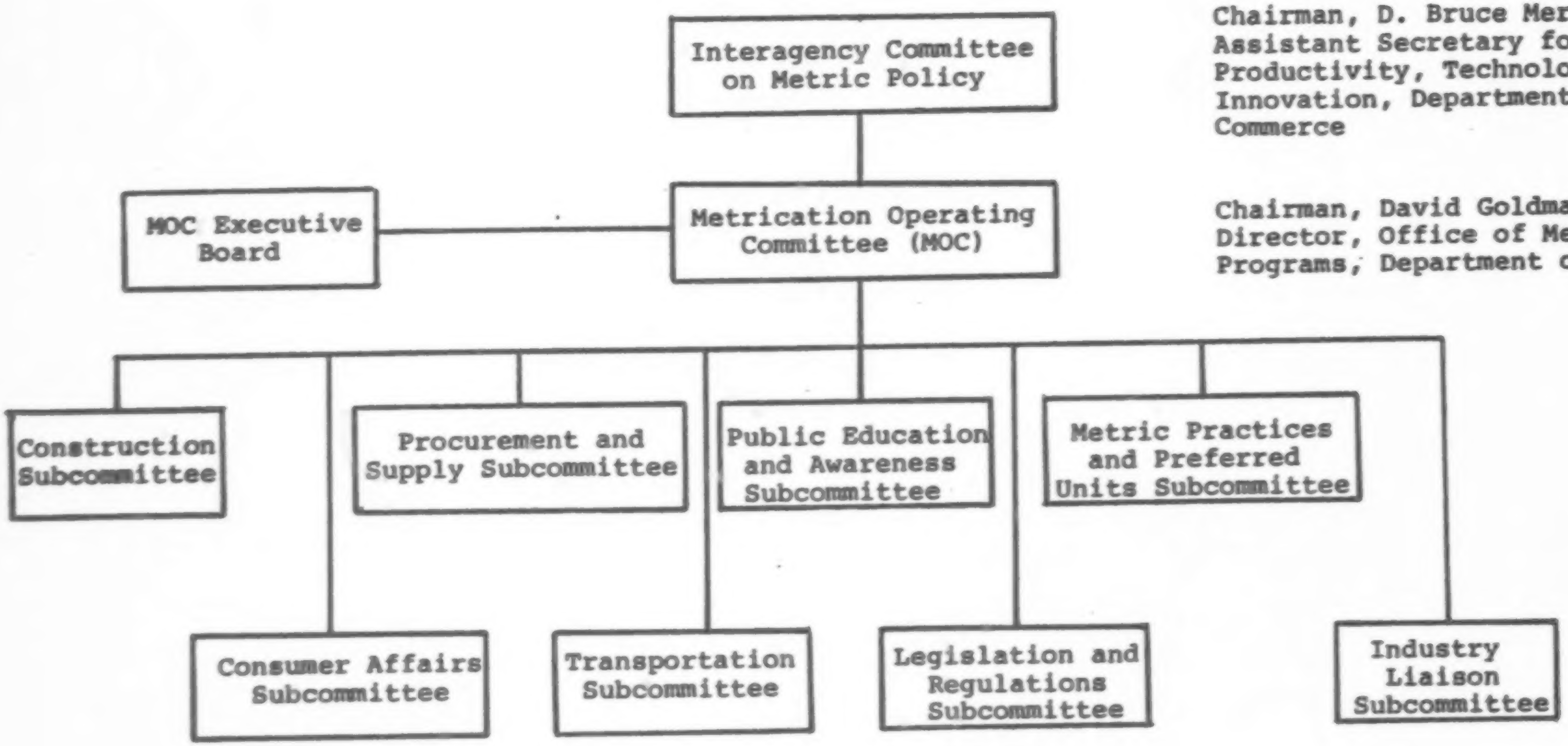
	Name	Agency
1.	D. Bruce Merrifield	Department of Commerce, ICMP Chairman
2.	David T. Goldman	Department of Commerce, Vice Chairman
3.	Howard B. Ellsworth	Department of Defense, Chairman
4.	Jeffrey Allan	Department of Defense
5.	Gary Dillard	Department of Defense
6.	Robert W. Poe	Department of Energy
7.	Donald Moore	Department of Housing and Urban Development
8.	Gail P. Lowe	Department of the Interior
9.	Donald E. Lemmon	Department of Labor
10.	Byron L. Nupp	Department of Transportation
11.	James I. Price	Consumer Product Safety Commission
12.	Robert B. Metz	Environmental Protection Agency
13.	Michael N. Zabych	General Services Administration
14.	Joseph A. Palank	Government Printing Office
15.	Charles N. Canestro	U.S. Information Agency
16.	Martin E. Foley	Interstate Commerce Commission
17.	Gary Columbia	Library of Congress
18.	Harry Sonnemann	National Aeronautics and Space Administration
19.	Paul E. Long	National Labor Relations Board
20.	Jane R. Glaser	Smithsonian Institution
21.	Robert E. McDonald	Tennessee Valley Authority
22.	Ruben H. Moller	U.S. International Trade Commission
23.	Theron E. Barr	U.S. Postal Service
24.	William Geibel	Veterans Administration
25.	Carl A. Beck	Guest, Chairman of Government Liaison Committee, ANMC
26.	Cheryl Cummins	Guest, Vice President, ANMC
27.	Hollis B. Vail	Guest, Former Department of Interior Metric Coordinator
28.	Ed Weintraub	Office of General Counsel Department of Commerce
29.	John M. Tascher	Office of Metric Programs, Department of Commerce, Executive Secretary

30.	Ed McEvoy	Office of Metric Programs, Department of Commerce
31.	Alan S. Whelihan	Office of Metric Programs, Department of Commerce
32.	Linda Cook	Office of Metric Programs, Department of Commerce
33.	Margaret Sexton	Office of Metric Programs, Department of Commerce

APPENDIX G.2

ORGANIZATION CHART OF THE ICMP AS OF SEPTEMBER 1, 1983

Organization Chart of the Interagency Committee on Metric Policy (ICMP) as of September 1, 1983


Interagency Committee on Metric Policy
Metrication Operating Committee (MOC)
MOC Executive Board
Construction Subcommittee
Procurement and Supply Subcommittee
Public Education and Awareness Subcommittee
Metric Practices and Preferred Units Subcommittee
Consumer Affairs Subcommittee
Transportation Subcommittee
Legislation and Regulations Subcommittee
Industry Liaison Subcommittee

Chairman, D. Bruce Merrifield
Assistant Secretary for
Productivity, Technology and
Innovation, Department of
Commerce

Chairman, David Goldman, Acting
Director, Office of Metric
Programs, Department of Commerce

APPENDIX G.3

NEWS RELEASE, DEPARTMENT OF COMMERCE, SEPTEMBER 26, 1983

UNITED STATES DEPARTMENT OF
COMMERCE
NEWS
WASHINGTON, D.C. 20230

ECONOMIC
AFFAIRS

EA 83-03

CONTACT: Linda Cook
(202) 377-0944

FOR IMMEDIATE RELEASE

GOVERNMENT PAVES THE WAY TO BUY METRIC PRODUCTS

Changes in federal regulations opening the way to inclusion of metric units in government purchasing specifications have been backed by an influential federal body.

"This action ensures that the federal government will not inadvertently discriminate against firms offering metric goods and services in fulfilling government contracts," said David Goldman, acting director of the Office of Metric Programs in the Department of Commerce. "Since federal government purchases represent nearly 10 percent of the U. S. GNP, this could have significance for companies that change to the metric system," he said.

The action was taken by unanimous vote of the Interagency Committee on Metric Policy, composed of members at the assistant secretary level from 38 federal agencies. It coordinates federal metric conversions to prevent conflicting policies and practices. The committee is chaired by Commerce's assistant secretary for productivity, technology, and innovation, Bruce Merrifield. The Office of Metric Programs serves as secretariat for the group.

The General Services Administration, which manages government procurement, will issue guidance to federal agencies on working with the private sector to develop metric standards and specifications. Changes will be made during the normal review cycle, as required by the Code of Federal Regulations.

Goldman believes the vote removes an important barrier to metric transition, and that "soon products produced in U. S. customary units and in metric units will be on an equal footing when offered to the federal government."

# # #

9/26/83

APPENDIX G.4

1982 ANNUAL REPORT, INTERAGENCY COMMITTEE ON METRIC POLICY

1982
ANNUAL
REPORT

THIRD REPORT OF THE INTERAGENCY COMMITTEE ON METRIC POLICY

Introduction 1

Executive Summary 2

Events During May 1, 1981-September 30, 1982 2

- a. Federal Agency Policy and Guidance 2
- b. Relations with the Private Sector and States.. 3
- c. Standards 5
- d. Productivity 7
- e. Information Activities 7
- f. MOC Subcommittees 8
- g. Final MOC Report to the U.S. Metric Board 10
- h. Administrative Matters 10

Probable Worklists for ICMP for FY 81 and FY 82 11

Appendix A 16
Brief History and Purpose of the ICMP and MOC

Appendix B 17
Members of the Interagency Committee on Metric Policy, August 6, 1982

Appendix C 21
Members of the ICMP Metrication Operating Committee, August 6, 1982

Appendix D 26
Probable Worklist for Fiscal Year 1982

THIRD REPORT OF THE INTERAGENCY COMMITTEE ON METRIC POLICY

INTRODUCTION

The Third Report of the Interagency Committee on Metric Policy (ICMP) reviews ICMP activities for the period from May 1, 1981, through September 30, 1982, which was the final day of operation of the U.S. Metric Board (USMB). The operational activities of the ICMP were undertaken by its Metrication Operating Committee (MOC) and the MOC subcommittees. Federal responsibility for metric activities, and the Executive Secretary and his functions were transferred to the Department of Commerce at the start of fiscal year 1983. A brief history and purpose of the ICMP/MOC is in Appendix A and the 1982 membership of the ICMP and the MOC are listed in Appendices B and C, respectively.

EXECUTIVE SUMMARY

The major activity of the ICMP during the reporting period was the seeking of a more effective liaison with private sector metric conversion planning committees. Cooperation with the private sector was improved during this reporting period by:

- MOC review of several industry sector conversion plans and documents.
- Discussion of ways to identify Federal officials to serve on private sector conversion committees.
- Publication of the Federal Metric Information Referral Directory which facilitates private sector efforts in working with Federal agencies.

The MOC held two meetings during the reporting period: June 17, 1981, and May 13, 1982. The MOC Metric Practice and Preferred Units Subcommittee met on November 18, 1981, the MOC Construction Subcommittee met on June 8, 1981, and December 7, 1981, and the MOC Legislation and Regulations Subcommittee met on June 16, 1981.

The activities of the ICMP, MOC, and MOC Subcommittees are reviewed in relation to the Probable Worklist for FY-81 and the Probable Worklist for FY 82 in this Report under Probable Worklists for ICMP for FY 81 and FY 82; Have They Been Adequately Addressed? (pp. 11-15). The Probable Worklist for FY 81 was adopted on December 4, 1980, to aid in communicating the ICMP annual objectives; this Report covers part of FY 81. The Probable Worklist for FY 82 was approved on November 12, 1981; this Report covers all of FY 82.

During part of this reporting period, the activities of the ICMP were influenced by the uncertain future status of the USMB, which was the chartering agency of the ICMP. Much of the uncertainty was eliminated by the letter dated March 9, 1982, from President Reagan to Dr. Polk, Chairman of the U.S. Metric Board, in which he stated his support for the policy of voluntary metrication expressed in the Metric Conversion Act of 1975, and that the Secretary of Commerce will be responsible for the Administration's continued support of voluntary metrication.

EVENTS DURING MAY 1, 1981-SEPTEMBER 30, 1982

Federal Agency Policy and Guidelines

The "Metric Conversion Policy for Federal Agencies" and the supporting "Federal Agency Guidelines for Implementation of Metric Conversion Policy" as approved by the ICMP were published in the Notice Section of the Federal Register on April 30, 1981. The Department of the Interior revised its metric policy to be consistent with the Policy and Guidelines, and the General Services Administration published an Order, "Metric System of Measurement" on September 28, 1981. Copies of the Federal Register notice were mailed to the chairman and secretary of each of the Sector Committees of the American National Metric Council (ANMC) during May 1981.

Relations With the Private Sector and States

The great majority of activities between the ICMP/MOC and the private sector has been through working with the American National Metric Council (ANMC). Good working relationships between the IMCP/MOC and ANMC have been maintained throughout the reporting period. At the June 17, 1981, meeting of the MOC, Mr. David Gorin, then Vice President of the ANMC, reported to the MOC that "the relationship with MOC has been good and beneficial to ANMC," and "hopes the relationship has been good for the Federal agencies." Mr. Gorin also reported at the meeting that ANMC believes the MOC's Model Guidelines for Federal Employee Participation in Private Sector Metric Conversion Planning Committees is an excellent document. The ANMC Sector Committees want the backing of agencies in addition to the backing of individual representatives. ANMC is vitally interested in finding the ways of maximizing effective Federal agency participation.

At the May 13, 1982, MOC meeting, Ms. Cheryl Cummins, Vice President of ANMC, stated that ANMC has been appreciative of the Federal participation through the MOC and individual agencies. She went on to say that ANMC wants public sector input, such as through additional Federal representatives, to the sector committees, and also input from private sectors to individual agencies. She invited the agencies to submit appropriate agency planning documents to ANMC for private sector input.

The MOC Executive Board worked with the ANMC on procedures for selecting and nominating Federal representatives to sector committees. At issue was how to most effectively select proper representation (e.g., should the burden of selection be on the sector committee or on the agency Metric Coordinator?). The MOC Executive Board attempted to develop a procedures document, but eventually came to the conclusion that the informal identification and naming of representatives on a case-by-case basis is preferable to formal procedures.

The MOC has been involved with review of ANMC Sector Conversion plans. The U.S. Metric Board held public hearings on December 17 and 18, 1981, for review and comment on two

Sector Conversion Plans, Chemical and Allied Products, and Instruments, submitted by sector committees of ANMC. The plans were published in the Federal Register for comment and were also mailed widely throughout their respective industries and to other interested parties as well as to the MOC. The Department of Defense and the General Services Administration presented testimony before the USMB Chemical and Allied Products hearing and the Department of Commerce and Department of Defense presented testimony at the Instruments Sector hearing. As a result of this testimony and review by the MOC of both plans the Federal agencies were able to provide their viewpoints.

Several selected MOC agencies were asked to provide input to an ANMC sponsored meeting on November 17, 1981, on the metrication of shipping and billing of titanium dioxide. This symposium was the first in a series of planned symposia on metrication in individual product areas.

ANMC established an Ad Hoc Tariff Task Group which developed a document "Standard Reference Tables for Metric Conversion of Transportation Tariffs" in October 1981. The booklet was circulated for comment to 12 selected MOC agencies in December. The Interstate Commerce Commission in a decision dated August 12, 1982, authorized carriers and agents to refer to this document for conversion of tariffs to the SI system.

During this reporting period, there has been a change in ANMC policy. Previously, ANMC had a policy of non-advocacy of metrication; it basically had served as a forum to deliberate issues. On February 9, 1982, the ANMC Board of Directors adopted a policy statement that states that

> "ANMC recognizes that the use of the International System of Units (SI) is increasing in the United States and that this trend is expected to continue until eventually SI is the predominant measurement system. The purpose of ANMC is to facilitate the transition process in a voluntary and orderly manner. . . .ANMC recognizes that the role of government is essential to the transition process and seeks government cooperation and support of voluntary conversion activities by the private sector toward the predominant use of SI. Conversely, ANMC will represent the private sector to the government in its transition process."

During the rest of Fiscal Year 1982, the MOC Executive Board deliberated on various ways to respond to the new ANMC policy in a cooperative way in securing agreement on the concept of a joint public-private sector partnership in the development of a national metric program. Out of this partnership would come the identification of specific areas, such as removal of regulatory barriers, which need to be addressed. Such a partnership would also minimize conflicting signals on goals and attitudes which both government and industry sometimes give and receive. The partnership would not promote metric conversion, but would promote resolution of issues.

The MOC Chairman, Mr. Howard Ellsworth, spoke at the second annual National Conference on State Metrication on June 23-25, 1981, in Des Moines, Iowa. Mr. Ellsworth stated the need for a strong interrelationship between the State and Federal metrication activities. There appears to also be a role for the state on private sector committees analogous to the Federal role.

Standards

For several years the MOC has observed that it has not been practical for many recent programs to employ metric measurements due in large part to unavailability of metric specifications and standards in both government and industry. The availability of such specifications and standards is a key factor in any voluntary decision to use the metric system in new designs. Progress in developing metric specifications and standards has been slow. There is concern that the lack of metric versions of specifications and standards in Federal agencies could serve as a barrier to private sector metrication. This concern has led to several initiatives during this reporting period.

1. In consultation with the MOC, the U.S. Metric Board circulated a survey questionnaire to standards preparing activities within the Department of Agriculture, Department of Defense, General Services Administration, National Aeronautics and Space Administration and the Veterans Administration (these agencies account for the vast majority of procurement-type standards and specifications developed by the Federal Government) asking for information within the Federal Supply Classes for which they are responsible. The information dealt with the extent of metrication within the classes, areas where metrication is foreseeable, the impact of Federal procurement in each of the classes, and the private sector bodies with which the standards preparing activities cooperate. Results were not yet available at the end of this reporting period.

2. Mr. Ellsworth, the Department of Defense Metric Coordinator as well as the MOC Chairman, asked the ANMC for private sector assistance in identifying standards which need metric versions on a priority basis by letter dated December 22, 1981. By response dated January 19, 1982, ANMC has agreed with this request and several sectors are now participating on a trial basis in identifying standards over which the Department of Defense has either cognizance or uses in its acquisition contracts.

Information from these two efforts will be useful in developing an MOC plan during FY 1983 to establish a target date for the availability of metric versions of Federal procurement standards and specifications. Such a target date would be similar in principle to the target date within the Department of Defense of 1990 to have a complete spectrum of metric standards and specifications.

The MOC approved a revision to the Federal Standard 376 "Preferred Metric Units for General Use by the Federal Government" dated July 8, 1980, during this reporting period. The revision was based originally on comments received in response to a circulation of the standard to all ANMC sector committees. The MOC approved in principle a draft revision at its meeting on May 13, 1982. By mail ballot, the MOC approved the final version in July 1982.

The MOC's Metric Practices and Preferred Units Subcommittee, in cooperation with the Metric Standards Subcommittee of the Interagency Committee on Standards Policy (ICSP), has continued to consider developing a recommended Federal position on the development of a single national metric practice standard to serve as an update to the American National Standard Z 210.1-1976. The Subcommittee developed a proposed Federal Standard 377, which would require agencies to use either the ASTM Standard for Metric Practice or the IEEE Metric Practice Standard except in those few cases where the two standards differ; in those few cases the Federal Standard would state the requirements for those Federal agencies. However, at its meeting on April 30, 1982, the ICSP Metric Standards Subcommittee decided that upon examination, the differences between the two standards are basically editorial in nature and the Federal Government should not attempt to determine which document should be recognized as the national standard for metric practices. Therefore, it recommended that either the 1982 versions of the IEEE or ASTM standards be acceptable for Federal agency use. A seal "approved for use by Federal agencies" to be indicated on the ASTM and IEEE metric practice standards was recommended by the Subcommittee. The MOC Executive Board concurred with these recommendations. The Subcommittee does encourage similarity between the IEEE and ASTM metric practice standards to reduce confusion and does encourage development of a single national standard to succeed American National Standard Z 210.1-1976.

Productivity and Metric Conversion

At the May 13, 1982, MOC meeting, Mr. Milbergs, Director of the Office of Productivity, Technology and Innovation in the Department of Commerce, reviewed the functions of his Office such as stimulation of improved productivity, removal of barriers to technological innovation, and study of policy areas related to productivity. He described the President's National Productivity Advisory Committee (NPAC) and its Research, Development and Technological Innovation Subcommittee. His Office is responsible for providing staff assistance to this NPAC Subcommittee. He requested from the MOC a paper on the relationship between productivity and metrication and the key issues involved for consideration by the Subcommittee. Dr. David Goldman, Vice Chairman of the MOC, put together a joint MOC-ANMC task group which developed a draft issues paper, Productivity and Metric Conversion, for presentation to the NPAC Subcommittee. The NPAC adopted the following resolution on metric conversion at its October 1, 1982, meeting:

> The Committee recommends that the Federal Government continue to support conversion to a system of metric measurement as a means of enhancing U.S. international competitiveness and hence productivity in several industries. The process of metric conversion should be voluntary and permitted to continue on an industry-by-industry basis, justified by competitive forces in the private sector. However, there should be no legislation mandating conversion. Federal, State and local laws should not impede the market-led conversion process. In this regard the Department of Commerce should provide a clearinghouse service to channel reports of regulatory and legal impediments to appropriate Federal, State and local officials for appropriate remedy.

Information Activities

The MOC published its first Federal Metric Information Referral Directory in December 1981. This Directory lists Federal Agency personnel knowledgeable about the status of metric conversion within areas of Federal responsibility. It had previously been difficult to obtain information about the extent of metric conversion in particular sectors. The

Directory was compiled from responses to a memorandum to the MOC from the Chairman asking each agency to identify areas which the agency plays a lead or "pre-eminent role" and the names of the agency persons knowledgeable about metric conversion in those areas. There are plans for periodically updating the Directory.

The ICMP "Resolution on the Use of Metric Units in Agency Press Releases," approved by the ICMP on May 4, 1981, called for inclusion of metric units in Agency news releases 90 days after approval of the Resolution; this 90-day period ended on August 7, 1981. A number of agencies including Department of Agriculture, Department of Defense, and the Department of the Interior now routinely include metric units in press releases. The press release resolution was circulated to all ANMC sector chairmen and secretaries on May 20, 1981.

The MOC is planning a seminar on metric conversion status and issues in the computer and data processing industry for Federal officials. This will serve as a prototype for seminars in other sectors for Federal officials.

MOC Subcommittees

During this reporting period, three of the Subcommittees were active:

Construction. The Construction Subcommittee met twice, on June 7, 1981 and December 7, 1981, at the call of the Chairman, James A. Parker of the General Services Administration. The Subcommittee accomplished four items at these meetings.

a. Reviewed and approved with several suggested changes the revision of ASTM Standard E 621-78, "Standard Practice for the Use of Metric (SI) Units in Building Design and Construction."

b. Reviewed the events since the National Institute of Building Sciences (NIBS) Construction Symposium in December 1980 adopted a resolution calling for a survey of the building community to ascertain their policy or position for or against metric conversion. According to the Resolution, if the recommendation is in favor of conversion, the NIBS will call for a metric conversion symposium to set time schedules for the various sectors of the construction industry. However, during the reporting period NIBS had no funds to initiate the survey.

c. Reviewed and approved Subcommittee Objectives.

d. Discussed a report of the Federal Construction Council which says that construction practices differ among the agencies with regard to metric, but this situation has not created a problem yet.

Legislation and Regulations. This Subcommittee had its first meeting on June 16, 1981, at the call of Mr. Daniel B. Peyser, Chairman, who was General Counsel of the U.S. Metric Board. The Subcommittee representatives are from the legal offices of eight Departments and Agencies. The Subcommittee developed a Statement of Purpose.

Metric Practices and Preferred Units. This Subcommittee met on November 18, 1981, at the call of Dr. David Goldman, Chairman, of the National Bureau of Standards. The Subcommittee developed two draft documents:

a. proposed Federal Standard 377, "Federal Standard on Metric Practice,"and

b. proposed revision of Federal Standard 376, "Preferred Metric Units for General Use by Federal Agencies."

(More detail on these two documents is provided under Standards above.)

The other MOC Subcommittees were inactive during the reporting period; these are the following: Consumer Affairs, Federal Employee Training, Fuel and Power, Procurement and Supply, Public Education and Awareness, and Transportation.

The MOC Information Working Group met on June 4, 1981, to:

a. discuss data base management systems which the MOC could consider developing and using for its metric status reports and for responding to problems.

b. discuss the usefulness of the composite Metric Directive, and

c. refine the draft Federal Metric Information Referral Directory.

Final MOC Report to the U.S. Metric Board.

The U.S. Metric Board asked the MOC chairman to report to the Board at its final meeting on July 8, 1982, (1) on MOC comments on the Board's 9 Findings and 6 Recommendations in the Board's final Summary Report to the President and Congress, and (2) on the future of the MOC as perceived by the MOC. With regard to the Findings, the MOC felt that they are basically consistent with the aggregate experience gained in the Federal agencies. The MOC felt that the Findings are an important contribution and that this new knowledge about contentious metric issues will minimize most of the fears and misconceptions about the problems and costs of metrication. The MOC generally supports the Recommendations. With respect to the future of the MOC, Mr. Ellsworth reported to the Board that the MOC believes the relationship with the U.S. Metric Board has been beneficial to the MOC, the MOC intends to continue complying with its charter until it is changed by the ICMP or the Department of Commerce, and that the MOC is developing closer working relationships with the ANMC.

Administrative Matters

The ICMP and MOC acted on a number of administrative items during the reporting period. During the year 1981, letters were sent to those agencies from which the ICMP or MOC representatives left because of the change of Administration; these letters asked for appointment of new representatives. To help the MOC representatives brief the incoming ICMP representatives, the MOC prepared a "Background Information Package for Briefing New ICMP and MOC Members." This document is an annotated bibliography of the documents considered most important in understanding the ICMP and MOC.

There was discussion during the reporting period on what is required for consensus ICMP approval actions. There is informal agreement that a consensus of approval is indicated by:

a. support from more than a majority of Departments and agencies voting, but not necessarily from all voting agencies,

b. support from a good mix of Departments and agencies according to size and function, and

c. good faith and diligent efforts by the Chairman to resolve negative votes.

It is felt that language of this type should be incorporated into the ICMP charter if and when it is revised. Also, the charter should recognize that much of the ICMP's business will be conducted by mail.

PROBABLE WORKLISTS FOR ICMP FOR FY 81 AND FY 82 -- HAVE THEY BEEN ADEQUATELY ADDRESSED?

Probable Worklist for FY 81.

The ICMP addresses and resolves metrication issues at the need-level of the Federal agencies rather than in accordance with an "accomplishment" schedule. Completion dates are dictated primarily by "urgency" and priorities constantly shift as agency needs shift. Listed in Table 1 are items which were to be dealt with during Fiscal Year 1981, and what was actually accomplished during that fiscal year.

It is the belief of the ICMP and MOC that they adequately addressed and, in most cases, completed the 15 tasks listed in the Probable Worklist for Fiscal Year 1981. In two cases, tasks were not completed because of external constraints, and in three cases tasks have to be addressed over several years.

Probable Worklist for Fiscal Year 1982.

The Probable Worklist was approved in November 1981. However, after approval, the future of the U.S. Metric Board as an agency and of the ICMP and MOC was in doubt. By the middle of calendar year 1982 it became clear that the U.S. Metric Board was not going to continue as an agency, but that the ICMP would continue in some form. Much of the ICMP effort was devoted to transition to the Department of Commerce which was successfully completed at the end of the fiscal year. The Probable Worklist for FY 82 is in Appendix D.

TABLE 1. PROBABLE WORKLIST FOR FISCAL YEAR 1981

Items on Worklist	Accomplishment During Fiscal Year
I. Metrication Policy	
1. Publish a "final" Policy and Guidelines in the Federal Register.	A final Policy and Guidelines was published in the Federal Register of April 30, 1981.
2. Investigate the need for further formalization of Policy and Guidelines.	MOC has investigated and has determined that no further formalization is needed; therefore, no recommendations have been made to the ICMP.
3. Encourage each agency to follow Policy and Guidelines, and to adopt formal agency policy and structure.	At the June 17, 1981, meeting of the MOC, agencies were encouraged to develop their own official agency directives consistent with the Federal Policy and Guidelines.
4. Provide assistance to the U.S. Metric Board, as requested by the USMB, in fulfilling its requirement to develop a Federal Plan.	The first phase (of two phases) of the U.S. Metric Board's Federal Plan was developed in cooperation with the MOC; it was accepted by the USMB on February 5, 1981. Work was then started on the second phase.
II. Increase Knowledge of Agency Metrication	
1. Set up an experimental functioning computer-based metric information system.	Metric coordinators in several agencies acquired access to computer terminals and there was occasional use of the system, but an effective "critical mass" was never attained.

2. Define specific types of information to be included in system.	Meetings were held by the MOC Information Working Group on December 1, 1980, and June 4, 1981, to define different usable data base management systems and the type of information to be included.
3. Define the need for status reports.	The MOC determined that the most effective and efficient way to determine status of metrication within agencies is to develop and maintain a Federal Metric Information Referral System.
4. Develop an expanded ICMP Annual Report.	An expanded ICMP Annual Report was developed, but not yet submitted for approval as of September 30, 1981 (it was approved on November 18, 1981).
III. Cooperation with the Private Sector	
1. Work with agencies to increase Federal representation on private sector committees in accordance with Federal Agency Participation Guidelines.	In a memorandum to the ICMP dated November 17,1980, attaching the approved participation guidelines, the ICMP chairman strongly encouraged agencies to use the guidelines to facilitate the naming and supporting of agency representatives to accommodate private sector metric planning committee needs. ANMC officials came to the MOC meetings of December 4, 1980, and June 17, 1981, requesting active participation of Federal personnel on ANMC committees. At the June 17, 1981, MOC meeting, the MOC reviewed a "Discussion Paper on Issue of Selection and Nomination of Federal Agency Representatives to ANMC Sector Committees" to determine if formal procedures for

identifying Federal representatives were needed. The MOC determined informal identification and naming of representatives on a case-by-case basis is preferable to formal procedures. In response to a letter from ANMC dated September 15, 1981, requesting assistance, the MOC worked to get representatives appointed from four Federal agencies to serve on the ANMC Chemical and Allied Products Sector Committee.

IV. Organize MOC Subcommittee Programs

1.	Develop a Federal position on ANMC Construction Plan.	Mr. Lee Rogers of the Department of the Navy, the Chairman of the MOC Construction Subcommittee, gave a report on Federal views of metric conversion in construction at the National Institute of Building Sciences (NIBS) Metric Symposium on December 2, 1980.
2.	Develop subcommittee objectives and active programs for Construction, Procurement and Supply, Transportation, and Consumer Affairs Subcommittees.	The Transportation Subcommittee developed two draft papers: Statement of Purpose of the Subcommittee, and Program for the Subcommittee. The Construction Subcommittee initiated the development of a Statement of Purpose.
3.	Encourage agencies to name representatives to Subcommittees in accordance with Guidelines for Participation on Subcommittees.	No significant MOC action was taken in this area.

V. Specific Metrication Actions

1.	Obtain ICMP approval of Press Release Resolution; encourage agency implementation of Resolution.	By memorandum dated May 4, 1981, to the ICMP, the ICMP Chairman declared that the Resolution was approved. There was a discussion at the June 17, 1981, MOC meeting encouraging agencies to put the Resolution into effect within the agencies.
2.	Identify and attempt to resolve real-life private sector/state issues.	The ICMP and MOC remained in a position of readiness to respond to issues. Selected MOC agencies reviewed plans for the ANMC Chemical and Allied Products Sector Plan, reviewed the ANMC Tariff Task Group's "Standard Reference Tables for Metric Conversion of Transportation Tariffs," and prepared to participate in the ANMC Titanium Dioxide Conference scheduled for November 17, 1981.
3.	Work toward Federal position on a single National Metric Practice Standard.	The MOC Metric Practice and Preferred Units Subcommittee, in cooperation with the ICSP Metric Standards Subcommittee, agreed to develop a proposed Federal Standard 377 on Metric Practice. Draft 2 of the Standard, dated August 7, 1981, would give guidance for use of the modernized metric system throughout the Federal Government.

APPENDIX A

Brief History and Purpose of the ICMP and MOC

Under the auspices of the Department of Commerce, the Metrication Subcommittee of the Interagency Committee on Standards Policy (ICSP) was formed in 1975 in response to increased metric conversion activity in the private and government sectors. In 1976, the ICSP recommended the establishment of the ICMP, independent from the ICSP, to provide high-level policy and conversion guidance on metrication activities to Federal agencies.

Representatives of the U.S. Metric Board, the Department of Commerce, and the Office of Management and Budget concurred in early 1978 that the proposed ICMP should be formed and function under the auspices of the newly-formed U.S. Metric Board. The USMB passed a resolution at its August 18, 1978, meeting to approve the establishment of the ICMP as specified in a proposed charter. On October 18, 1978, members-designate from interested Federal Agencies approved the proposed charter, thus creating the ICMP. Also at this meeting, the ICMP accepted an offer from the Department of Commerce to transfer the ICSP Metrication Subcommittee to the ICMP, to become the Metrication Operating Committee (MOC). The ICMP addresses Federal policy and issues associated with metrication. There are currently 36 member agencies represented by policymaking individuals at a senior level. The MOC is the working arm of the ICMP and is made up of 43 management-level representatives with responsibility for coordinating operational metric issues with the Federal community. Some MOC member agencies are not members of the ICMP. The MOC develops recommended policies, plans and activities for ICMP approval.

With the abolition of the U.S. Metric Board effective September 30, 1982, the ICMP structure is being continued under the auspices of the U.S. Department of Commerce.

Information on ICMP activities from October 18, 1978, through January 1980 is contained in the "First Annual Report to the U. S. Metric Board, Interagency Committee on Metric Policy." Information for these activities from January 1980 through April 1981 is contained in the "Second Annual Report of the Interagency Committee on Metric Policy to the U.S. Metric Board." Copies of both reports can be obtained by contacting the Office of Metric Programs, OPTI, U.S. Department of Commerce, Washington, D. C. 20230.

APPENDIX B

Interagency Committee on Metric Policy

August 6, 1982

Department of Agriculture

Mr. William G. Lesher
Assistant Secretary for
Economics
Department of Agriculture
Room 227E
Washington, DC 20250
(202) 447-4164

Department of Commerce

Dr. Ernest Ambler
Director, National Bureau of
Standards
Department of Commerce
Washington, DC 20234
(202) 921-2411

Department of Defense

Mr. William A. Long
Deputy Under Secretary
for Acquisition Management
Department of Defense
The Pentagon, Room 3E144
Washington, DC 20301
(202) 695-7145

Department of Energy

Mr. William Vaughan
Assistant Secretary for
Environmental Protection
Safety and Emergency Preparedness
Department of Energy
100 Independence Avenue, SW
Room 4G084
Washington, DC 20585
(202) 252-4700

Department of Health and Human Services

Mr. Gerald H. Britten
Deputy Assistant Secretary
for Program Systems
Department of Health and
Human Services
220 Independence Avenue, SW
Washington, DC 20201
(202) 245-1863

Department of Housing and Urban Development

Mr. Philip D. Winn
Assistant Secretary for
Housing
Department of Housing and
Urban Development
451 7th Street, SW, Rm. 9100
Washington, DC 20410
(202) 755-6600

Department of the Interior

Mr. J. Robinson West
Assistant Secretary for
Policy, Budget, and Admin.
Department of the Interior
18th and C Streets, NW
Washington, DC 20240
(202) 343-6181

Department of Labor

Mr. Alfred M. Zuck
Assistant Secretary for
Admin. and Management
Department of Labor
200 Constitution Avenue, NW
Washington, DC 20210
(202) 523-9086

Department of State

Mr. Thomas M. Tracy
Assistant Secretary for
Administration
Department of State
Room 6316
Washington, DC 20520
(202) 632-1492

Department of Transportation

Ms. Judith T. Connor
Assistant Secretary for
Policy and International
Affairs
Department of Transportation
Room 10228
Washington, DC 20590
(202) 426-4544

Federal Reserve Board

Mr. John M. Denkler
Staff Director for Management
Federal Reserve Board
Rm. B-2047A
Washington, DC 20551
(202) 452-3764

Federal Trade Commission

Mr. James H. Sneed
Director, Bureau of
Consumer Protection
Federal Trade Commission
Washington, DC 20580
(202) 523-3727

General Service Administration

Mr. William B. Ferguson
Acting Assistant Administrator
for Acquisition Policy
General Services Administration
18th and F Streets, NW
Room 6002
Washington, DC 20405
(202) 566-1043

Government Printing Office

Mr. Joseph A. Palank
Director of Engineering
Government Printing Office
North Capitol and H Streets, NW
Washington, DC 20423
(202) 275-2648

Interstate Commerce Commission

Mr. Martin E. Foley
Director, Bureau of Traffic
Interstate Commerce Commission
Room 4318
Washington, DC 20423
(202) 275-7348

Library of Congress

Mr. Glenn A. Zimmerman
Associate Librarian
for Management
Library of Congress
Washington, DC 20540
(202) 426-5560

National Aeronautics and Space Administration

Mr. Walter C. Williams
Chief Engineer
Mail Code D
National Aeronautics and Space
Administration
Washington, DC 20540
(202) 755-3092

Small Business Administration

Mr. R. F. McDermott
Associate Administrator for
Procurement and Technology
Assistance
Small Business Administraton
1441 L Street, NW
Washington, DC 20416
(202) 653-6588

Smithsonian Institution

Mr. Paul N. Perrot
Assistant Secretary for Museum
Programs
900 Jefferson Drive, SW
Washington, DC 20560
(202) 357-3125

Tennessee Valley Authority

Dr. Ralph Brooks
Director, Division Water Resources
Tennessee Valley Authority
141 Evans Building
Knoxville, Tennessee 37902
FTS (8) 856-6565

U.S. International Trade Commission

Mr. Norris A. Lynch
Director, Office of Industries
U.S. International Trade Commission
701 E. Street, NW
Washington, DC 20436
(202) 523-0146

Federal Reserve Board

Mr. John M. Denkler
Staff Director for Management
Federal Reserve Board
Rm. B-2047A
Washington, DC 20551
(202) 452-3764

Federal Trade Commission

Mr. James H. Sneed
Director, Bureau of
Consumer Protection
Federal Trade Commission
Washington, DC 20580
(202) 523-3727

General Service Administration

Mr. William B. Ferguson
Acting Assistant Administrator
for Acquisition Policy
General Services Administration
18th and F Streets, NW
Room 6002
Washington, DC 20405
(202) 566-1043

Government Printing Office

Mr. Joseph A. Palank
Director of Engineering
Government Printing Office
North Capitol and H Streets, NW
Washington, DC 20423
(202) 275-2648

Interstate Commerce Commission

Mr. Martin E. Foley
Director, Bureau of Traffic
Interstate Commerce Commission
Room 4318
Washington, DC 20423
(202) 275-7348

Library of Congress

Mr. Glenn A. Zimmerman
Associate Librarian
for Management
Library of Congress
Washington, DC 20540
(202) 426-5560

National Aeronautics and Space Administration

Mr. Walter C. Williams
Chief Engineer
Mail Code D
National Aeronautics and Space
Administration
Washington, DC 20540
(202) 755-3092

Small Business Administration

Mr. R. F. McDermott
Associate Administrator for
Procurement and Technology
Assistance
Small Business Administraton
1441 L Street, NW
Washington, DC 20416
(202) 653-6588

Smithsonian Institution

Mr. Paul N. Perrot
Assistant Secretary for Museum
Programs
900 Jefferson Drive, SW
Washington, DC 20560
(202) 357-3125

Tennessee Valley Authority

Dr. Ralph Brooks
Director, Division Water Resources
Tennessee Valley Authority
141 Evans Building
Knoxville, Tennessee 37902
FTS (8) 856-6565

U.S. International Trade Commission

Mr. Norris A. Lynch
Director, Office of Industries
U.S. International Trade Commission
701 E. Street, NW
Washington, DC 20436
(202) 523-0146

U.S. Postal Service

Mr. Adam Kegel
Technical Consultant
Postal Technology Research Office
Research and Development
Laboratories
U.S. Postal Service
11711 Parklawn Drive
Rockville, MD 20852
(301) 443-6266

Veterans Administration

Mr. Clyde C. Cook
Associate Administrator
for Supply Services
Veterans Administration
810 Vermont Avenue, NW
Washington, DC 20420
(202) 389-3808

Office of Technology Assessment

Dr. Samuel Hale
Office of Technology Assessment
U.S. Congress
Washington, DC 20510
(202) 224-3827

Office of Science & Technology Policy

Mr. John Marcum
Senior Advisor for Technology
and Arms Control
Office of Science & Technology
Old Executive Office Building
Washington, DC 20500
(202) 395-6202

APPENDIX C

ICMP Metrication Operating Committee *

August 6, 1982

Department of Agriculture

Mr. Richard J. Schrimper
Department of Agriculture
4839 South Building
Washington, DC 20250
(202) 447-6202

Department of Commerce

Dr. David T. Goldman
Associate Director for Longe Range
  Planning
National Measurement Laboratory
National Bureau of Standards
Washington, DC 20234
(301) 921-3304

Department of Defense

Mr. Howard B. Ellsworth
OUSD (R&E)SS
Department of Defense
Room 2A318, The Pentagon
Washington, DC 20310
(202) 695-7915

Department of Education

Dr. Floyd Davis
Director, Metric Education Program
400 Maryland Avenue, SW
Donohoe Building, Rm. 1628
Washington, DC 20202
(202) 426-7220

Department of Energy

Mr. Robert W. Poe
Operational and Environmental
  Safety Division
  EP-35
Department of Energy
Washington, D.C. 20585
(301) 353-5639

Department of Health and Human Services

Mr. George Grob
Director, Division of Planning
  and Policy Coordination
Department of Health and Human
  Services
Hubert H. Humphrey Building-Rm. 447-D
Washington, DC 20201
(202) 245-7150

Department of Housing and Urban Development

Mr. Donald K. Baxter
Director, Office of Architecture
  and Engineering Standards
Department of Housing and Urban
  Development, Rm. 6170
451 7th Street, SW
Washington, DC 20410
(202) 755-5718

Department of the Interior

Mr. Hollis B. Vail
Office of Management Consulting
Department of Interior
18th and C Streets, NW
Washington, DC 20240

Department of Justice

Mr. J. Michael Clark
Chief, Material Policy Group
Property Management and
  Procurement Staff
Department of Justice, Rm. 6309
Constitution Avenue and 10th
  Street, NW
Washington, DC 20530
(202) 633-1052

*Members are also the Metric Coordinators of their Agencies

Department of Labor

Mr. Donald E. Lemmon
Director, Management Policy
and Systems
Department of Labor, S.5526
200 Constitution Avenue, NW
Washington, DC 20210
(202) 523-6073

Department of State

Mr. Peter E. Gurvin
Department of State
Office of Foreign Bldgs. (A/FBO)
Engineering Branch, Rm 327, SA-6
Washington, DC 20520
(202) 235-9508

Department of Transportation

Mr. Byron L. Nupp
Office of Intermodal Transporation, P-10
Department of Transportation
400 7th Street, SW, Room 10301
Washington, DC 20590
(202) 426-4435

Department of the Treasury

Mr. Edward W. Brooks
Director, Office of
Administrative Programs
Department of the Treasury
Main Treasury - Room 2434
Washington, DC 20220
(202) 566-2881

Central Intelligence Agency

Mr. David B. Matthews
Office of Logistics
Plans and Programs Staff
Central Intelligence Agency
Washington, DC 20505
(202) 281-8131

Civil Aeronautics Board

Mr. Gerold Coffee
Assistant Section Chief
Data System Management Division
Civil Aeronautics Board, B46B
1825 Connecticut Avenue, NW
Washington, DC 20428
(202) 673-5925

Commission of Fine Arts

Mr. Charles H. Atherton,
Secretary
The Commission of Fine Arts
708 Jackson Place, NW
Washington, DC 20006
(202) 343-5324

Consumer Product Safety Commission

Mr. James I. Price
Director, Mechanical and Textile
Engineering Division
Consumer Product Safety Commission
5401 Westbard Avenue, Rm. 900
Bethesda, MD 20207
(301) 492-6604

Environmental Protection Agency

Dr. Courtney Riordan, Director
Office of Monitoring Systems
and Quality Assurance
Office of Research and Development
Environmental Protecton Agency
Washington, DC 20460
(202) 426-2202

Export-Import Bank of the United States

Mr. Albert H. Hamilton
Government Affairs Office
Export-Import Bank of the
United States
811 Vermont Avenue, NW, Rm. 1238
Washington, DC 20571
(202) 566-8853

Farm Credit Administration

Mr. Paul C. Redmer
Director, Administrative Division
Farm Credit Administration
490 L'Enfant Plaza, SW
Washington, DC 20578
(202) 755-4394

Federal Communications Commission

Mr. Daniel Yates
Office of Chief Engineer
Research and Standards Division
Federal Communications Commission
2025 M Street, NW
Washington, Dc 20544
(202) 632-7054

Federal Maritime Commission

Mr. Newton Frank
Chief, Office of Financial
Analysis
Federal Maritime Commission
1100 L Street, NW
Washington, DC 20573
(202) 523- 5873

Federal Reserve Board

Mr. Robert Zemel
Assistant Director, Division
of Data Processing
Federal Reserve Board
Washington, DC 20551
(202) 452-2801

Federal Trade Commission

Mr. James H. Sneed
Director, Bureau of Consumer
Protection
Federal Trade Commission
Washington, DC 20480
(202) 523-3727

General Services Administration

Mr. Michael N. Zabych
Office of Acquisition Policy
General Services Administration
19th & E Streets, NW, Rm 6014
Washington, DC 20405
(202) 566-1224

Government Printing Office

Mr. Joseph A. Palank
Director of Engineering
Government Printing Office
North Capitol & H Streets, NW
Washington, DC 20401
(202) 275-2402

International Communications Agency

Mr. Charles N. Canestro
Management Analysis/Regulations
Staff
International Communications Agency
Washington, DC 20547
(202) 724-0403

Interstate Commerce Commission

Mr. Martin E. Foley
Director, Bureau of Traffic
Interstate Commerce Commission
Washington, DC 20423
(202) 275-7348

Library of Congress

Mr. Floyd D. Hedrick
Chief, Procurement and
Supply Division
Library of Congress
1701 Brighseat Road
Landover, Maryland 20785
(202) 287-8605

National Aeronautics and Space Administration

Mr. William E. McInnis
National Aeronautics and Space Adminsitration
Code D
Washington, DC 20546
(202) 755-3200

National Labor Relations Board

Mr. Paul E. Long
Deputy Director of Administration
National Labor Relations Board
Washington, DC 20570
(202) 254-9200

Nuclear Regulatory Commission

Mr. Laurids Porse
Senior Mechanical Engineer
Division of Engineering Technology
Nuclear Regulatory Commission
Washington, DC 20555
(202) 443-5903

Securities and Exchange Commission

Mr. Richard J. Kanyan
Director, Office of Administrative Services
Securities and Exchange Commission
500 N. Capitol Street, NW, Rm. 2117
Washington, DC 20549
(202) 523-5980

Small Business Administration

Mr. Roger Hanson
Office of Technology Assistance
Small Business Administration
1441 L Street, NW, Rm. 630
Washington, DC 20416
(202) 653-6586

Smithsonian Institution

Mr. Paul Perrot
Assistant Secretary for Museum Programs
Smithsonian Institution
Washington, DC 20560
(202) 381-6581

Tennessee Valley Authority

Mr. Ralph H. Brooks
Tennessee Valley Authority
141 Evans Building
Knoxville, Tennessee 37902
FTS (8) 856- 6565

Office of Personnel Management

Mr. Gene Bennett
Chief of Training Research
Coordination Branch
Training Management Services Division
Office of Personnel Management
P.O. Box 7230
Washington, DC 20415
ATTN: Rm. 200TC
(202) 563-6175

U.S. International Trade

Mr. Norris A. Lynch
Director, Office of Industries
U.S. International Trade Commission
Washington, DC 20436
(202) 523-0146

U.S. Postal Service

Mr. Adam Kegel
Technical Consultant
Postal Technology Research Office
Research and Development
  Laboratories
U.S. Postal Service
11711 Parklawn Drive
Rockville, MD 20852
(301) 443-5311

Veterans Administration

Mr. John W. Marshall
Chief Quality Assurance Specialist
Procurement Division
Supply Service
Veterans Administration
Washington, DC 20420

Office of Technology Assessment

Dr. Samuel Hale
Office of Technology Assessment
U.S. Congress
Washington, DC 20510
(202) 224-3827

Office of Consumer Affairs

Mr. Charles R. Cavagnaro
Office of Consumer Affairs
Reporter's Building, Rm. 623
Washington, DC 20201
(202) 755-8875

Interagency Committee on Standards Policy (Liaison to MOC)

Mr. Ronald Kunihiro
Chairman, ICSP Metrication
  Subcommittee
Defense Material Standards
  and Specifications Office
Two Skyline Place
5203 Leesburg Pike, 14th Floor
Falls Church, VA 22041
(703) 756-2342

U.S. Metric Board

Mr. Stanley R. Parent
Director, Office of Research
  Coordination and Planning
U.S. Metric Board
1600 Wilson Boulevard, Suite 400
Arlington, VA 22209
(703) 235-2583

APPENDIX D

Approved November 1981

Probable Worklist for
Interagency Committee on Metric Policy (ICMP)
Fiscal Year 1982

The ICMP addresses and resolves metrication issues at the need-level of the Federal agencies rather than in accordance with an "accomplishment" schedule. Completion dates are dictated primarily by "urgency" and priorities constantly shift as agency needs shift. Listed below are items which will be dealt with by the ICMP/MOC during Fiscal Year 1982.

I. Metrication Policy.

1. Monitor the status of metric policies within each Federal agency.
2. Provide assistance to the USMB as requested by the USMB in fulfilling its requirement to develop a Federal Plan.
3. Provide assistance to Federal agencies through the development of guidelines on metrication issues (e.g., develop a training and awareness model program).
4. Put in more usable form the "Composite of Federal Agency Metric Policies."

II. MOC SUBCOMMITTEE PROGRAMS.

1. Develop the Subcommittees to the point where they can help define and address Federal agency related issues of national importance.
2. Develop objectives and action programs for the Procurement and Supply, Consumer Affairs, Public Education and Awareness, Legislation and Regulations, and Transportation Subcommittees.
3. Enhance Federal/private sector relationships through Subcommitte activity. (e.g., develop a constructive relationship with National Institute of Building Sciences (NIBS) in carrying out the NIBS resolution).
4. Develop reporting requirements from MOC Subcommittee Chairman to the MOC.

III. Metric Information

1. Expand the computer-based metric information system to include more agencies.
2. Expand the "Federal Metric Information Referral Directory".

IV. Cooperate with the Private Sector/States.

1. Identify national issues related to metrication in which agencies have a significant role and develop recommendations to the U.S. Metric Board.
2. Expand coordination activities to include State metric programs. Establish liaison with State Metric Coordinator through USMB and determine Federal/State issues for resolution.
3. Continue coordination/involvement with ANMC established in FY81 and expand to other metric organizations.

V. Specific Metrication Action.

1. Establish a subcommittee to address Federal efforts on computer software standards.

APPENDIX G.5

1981 ANNUAL REPORT, INTERAGENCY COMMITTEE ON METRIC POLICY

1981
ANNUAL
REPORT

1981 ANNUAL REPORT

Interagency Committee on Metric Policy

SECOND ANNUAL REPORT OF THE INTERAGENCY COMMITTEE ON METRIC POLICY TO THE U.S. METRIC BOARD

PAGE

Introduction 1

Events During January 1, 1980 -
April 30, 1981 2

Appendix A
Brief Hisotry of the ICMP and
MOC. 10

Appendix B
Members of the Interagency Committee
on Metric Policy 11

Appendix C
Members of the ICMP Metrication
Operating Committee. 19

Appendix D
Probable Worklist for FY-81
Interagency Committee on Metric Policy 29

Appexdix E
Federal Register Notice
Thursday, April 30, 1981 31

Second Annual Report of the Interagency Committee on Metric Policy to the U.S. Metric Board

January 1, 1980 - April 30, 1981

INTRODUCTION

The second Annual Report of the Interagency Committee on Metric Policy (ICMP) to the U.S. Metric Board (USMB) reviews ICMP activities for the period from January 1980 through April 30, 1981, which was the date of publication in the Federal Register of the "Metric Conversion Policy for Federal Agencies" and the supporting "Federal Agency Guidelines for Implementation of Metric Conversion Policy."

During this reporting period, the objectives of the ICMP were to continue to establish a framework for Federal Government coordination of metric conversion activities, to strenghten its liaison with private sector organizations, and to improve communications with the USMB. Highlights of activities in each of these areas for this reporting period are:

- Finalization of the "Policy and Guidelines for Federal Agencies,"
- Development of "Model Guidelines for Participation by Federal Agency Personnel on Private Sector Metric Conversion Planning Committees," and
- Participation in and support of USMB's development of a Federal Plan for metric conversion.

The ICMP operates under the auspices of the USMB to address Federal policy and issues associated with metrication. There are currently 37 member agencies represented by policymaking individuals at a senior level. The Metrication Operating Committee (MOC) is the working arm of the ICMP and is made up of 44 management-level representatives with responsiblity for coordinating operational metric issues within the Federal community. Some MOC member agencies are not members of the ICMP. The MOC develops recommended policies, plans, and activities for ICMP approval. An MOC Executive Board serves as the MOC's administrative/management arm. A brief history of the ICMP/MOC is in Appendix A and the 1980 membership of the ICMP and the MOC is listed in Appendices B and C; in cases where membership on the ICMP and MOC has changed since 1980, the current members are also listed.

The MOC held two meetings during the reporting period: June 4, 1980, and December 4, 1980. The Metric Practices and Preferred Units Subcommittee met on February 12, 1980, and on January 30, 1981, and a number of planning meetings were held to organize the subcommittees on Construction, Federal Employee Training, Legislation and Regulations, Public Education and Awareness, and Transportation.

The activities of the ICMP, MOC, and MOC Subcommittees can be reviewed in relation to the Probable Worklist for FY-81.

ICMP Probable Worklist for FY-81

At its December 4, 1980 meeting, the MOC approved the Probable Worklist for FY-81 which was developed to aid in communicating the ICMP annual objectives. Items which the MOC believed the ICMP and the MOC should deal with in FY-81 were listed. These included the establishment of a Federal Agency Metrication Policy, increased knowledge of agency metrication, cooperation with the private sector, organization of the MOC Subcommittee programs, and several specific metrication actions. A complete copy of the Probable Worklist appears in Appendix D.

EVENTS DURING JANUARY 1, 1980 - APRIL 30, 1981

Federal Agency Policy and Guidelines

The "Metric Conversion Policy for Federal Agencies" and the supporting "Federal Agency Guidelines for Implementation of Metric Conversion Policy" as approved by the ICMP were published in the Federal Register on January 8, 1980, for comment. Approximately 165 comments were received and then considered and resolved by the MOC.

A revised Federal Register Notice, publicizing the Policy and Guidelines based on the resolved comments, was approved by the MOC. The ICMP Chairman, upon the recommendation of the MOC Chairman, asked the ICMP to review and consider for approval the Policy and Guidelines. The revised Federal Register Notice was declared approved by the ICMP on February 3, 1981. At its February 5, 1981 meeting, the U.S. Metric Board approved the revised Federal Register Notice on the Policy and Guidelines. On April 24, 1981, the Office of Management and Budget cleared the document for final publication in the Federal Register. The Policy and Guidelines were published in the Notice Section of the Federal Register on April 30, 1981.

The purpose of the Policy is to state for Federal Agencies a policy for dealing with the increasing use of the metric system within the Federal Government, with consideration of voluntary conversion in the state and local governments, and the private sector. The Guidelines are to be used to support and implement the metric conversion policy for agencies of the Federal Government. The intent is to clarify the basic Federal policy and assist in the development and coordination of cost-effective metrication activities and programs. A copy of the Policy and Guidelines is in

Appendix E.

Federal Plan

At its February 1980 meeting the U.S. Metric Board passed the following resolution:

> "USMB staff proceed immediately to develop a plan which will insure that all top-level Federal policymakers are made aware of USMB policy, the House Committee instructions, the ICMP Charter and relationship of the ICMP and USMB.
>
> Further, a plan be developed to insure implementation and provide monitoring of the instructions given the USMB by our House Committee,
>
> -and-
>
> Recommend a structure which provides for the most effective working relationship between USMB, ICMP, and the MOC."

At the February 5, 1981, meeting of the U.S. Metric Board, that portion of the Federal Plan dealing with the relationship between the USMB and the ICMP was presented by Mr. Stanley R. Parent, Deputy Executive Director, and the Board's representative to the MOC. The salient points of the Plan consist of:

1. Reporting - The Board will be kept informed through:
   - a. An Annual Report from ICMP to USMB presented formally, and in time to be included in the USMB Annual Report.
   - b. Direct reports from Interagency Committee Officers on significant action items.
   - c. USMB staff reports on general business and more routine action items.
2. Objectives - The "Probable Worklist" will be provided to USMB for information. The "Probable Worklist", which is developed every year, lists items which the ICMP/MOC plan to deal with during the coming year. Board input will be solicited.

3. Review - Action items of substantial importance will be brought to USMB for approval. The decision on degree of importance will be made by the ICMP Chairman and based on joint recommendations forwarded to him from the MOC Chairman and USMB staff responsible for Federal Programs.

4. Resources - USMB will identify its Federal Program commitments in its Annual Operating Plan and Annual Budget. These commitments will be based on staff recommendations and subject to Board approval as part of the general planning cycles.

At the February 5, 1981, USMB meeting, the MOC Chairman, Mr. Howard Ellsworth, presented three action items to the Board in order to fulfill requirements of the Federal Plan. Those items were:

- The ICMP Annual Report to the USMB for the period from inception to January 1980.
- The ICMP Probable Worklist for FY 81.
- The final version of the Federal Policy and Guidelines.

The Board voted to accept the report and to approve the Federal Policy and Guidelines.

By memorandum dated February 12, 1981, to the U.S. Metric Board members, Mr. Parent notified the Board members of two ICMP actions for information:

- MOC approval of "Model Guidelines for Federal Employee Participation in Private Sector Metric Conversion Planning Committees."
- ICMP approval of "Resolution on the Use of Metric Units in Agency Press Releases" and supporting "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units (SI)."

The portion of the Federal Plan dealing with the interrelationships of individual agencies with the Metric Board is scheduled to be addressed later in 1981.

Relations with the Private Sector

Charles Buckingham, President of the American National Metric Council (ANMC), addressed the MOC at its June 4, 1980, meeting. He discussed ANMC activities of interest to the Federal Agencies and the role of federal participants in sector committees. Mr. Buckingham also suggested that the agencies might be interested in participating on two special task groups on tariffs and standards which were being established at that time. He finished by saying that planning is essential to a sound conversion program and emphasized that "government representation is absolutely vital."

This presentation led to the approval of the "Model Guidelines for Participation on Private Sector Metric Conversion Planning Committees" document at the June 4 meeting. It was felt that such guidelines were necessary in order to guide employees in the same direction, to help address coordination problems, to charge employees to keep their agencies informed, and to help satisfy the consensus procedures approach used by private sector metrication committees (by ANMC, for example).

David Gorin, Vice President of the ANMC, met with the MDC Executive Board on November 4, 1980, to give ANMC's comments on the Model Guidelines. He stated that the ANMC was pleased with the document, especially because it is interested in and welcomes Federal participation on its committees. He also said that ANMC was naming staff contacts who are responsible for communications with specified Federal agencies.

On November 17, 1980, Dr. Polk sent the Model Guidelines to the ICMP by memorandum encouraging the agencies to adopt the Model Guidelines (incorporating them into existing directives, for example) and to name agency representatives to private sector committees.

In another private sector matter four MDC members participated on a Federal panel at the Sixth Annual ANMC Conference in San Francisco on May 11-14, 1980. Mr. Ellsworth served as the moderator and reported on "Federal Metrication Policy and Initiatives". The three other participants reported on metrication activities in their respective agencies:

- Robert A. Owen, Department of Agriculture
- David T. Goldman, Department of Commerce
- A. H. Brogan, General Services Administration

Resolution on Press Releases and Conversion Guidelines

The ICMP adopted on February 4, 1981, the "Resolution on the Use of Metric Units in Agency Press Releases" and the supporting "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units (SI)." The objective of the Resolution and Guidelines is to encourage consistency of style of customary and metric units in press releases throughout all participating Federal Agencies. The Resolution called for inclusion of metric units in Agency news releases 90 days after approval of the Resolution (August 7, 1981). The Guidelines reference Federal Standard No. 376 (July 8, 1980), "Preferred Metric Units for General Use by the Federal Government," which was developed by the MDC.

Development of Federal Standard No. 376

The Federal Standard was originally developed by the Metric Practices and Preferred Units Division of the Metrication Subcommittee of the Interagency Committee on Standards Policy (ICSP), predecessor to the MOC. It was coordinated with all members of the MOC. The Federal Standard was issued on July 8, 1980, by the General Services Administration at the request of the MOC Metric Practices and Preferred Units Subcommittee.

Standards

The MOC has been kept informed of Federal Agency standards matters. The Chairman (Mr. Ronald A. Kunihiro of the Department of Defense) of the Metric Standards Subcommittee of the Interagency Committee on Standards Policy serves as a member of the MOC Executive Board and acts as liaison between the MOC and the Subcommittee. Several standards events during the reporting period were of interest to the MOC such as the memorandum signed on March 7, 1980, by Dr. William J. Perry, Under Secretary of Defense, Research and Engineering. The memorandum established a target date of January 1, 1990 for the availability of a complete spectrum of metric standards and specifications which can be used in place of the 40,000 documents listed in the DOD Index of Specifications and Standards.

Federal Agency Status Report

The ICMP Chairman requested in a November 6, 1980, memorandum to the ICMP, information on agency metrication activities. The responses formed the basis for information on Federal metric status for the USMB 1980 Annual Report and will also be used by USMB to determine the nature of current Federal Agency policies and directives.

Metrication Operating Committee (Miscellaneous)

Dr. David Goldman of the National Bureau of Standards in the Department of Commerce was appointed by Dr. Polk as the new MOC Vice Chairman on April 3, 1980, in accordance with MOC approved procedures.

Mr. Stanley R. Parent, USMB Deputy Executive Director, was named on March 31, 1980, to replace Mr. Carl Beck, former member of the USMB, as the USMB liaison to the MOC.

MOC Subcommittees

The MOC Subcommittees play a very important role in identifying and assisting in the resolution of interagency metrication issues. As major issues develop, the Subcommittee Chairmen keep the MOC informed and involved to an appropriate extent. They are also aware of the need for proper representation from Federal Agencies as specific issues are raised. During the reporting period, Mr. John Tascher, the MOC Executive Secretary, began assisting several Subcommittee Chairmen in developing Subcommittee plans and objectives.

At its June 4, 1980, meeting, the MOC adopted "Guidelines for Federal Employee Participation on MOC Subcommittees." The purpose is to establish a mechanism to keep the Agency Metric Coordinator, Subcommittee representatives, and agency activities informed of the planning, scheduling, and implementing activities of the Subcommittees, and to serve as a way to convey the positions of the Agency to the Subcommittees.

Construction Subcommittee

Lee E. Rogers of the Naval Facilities Engineering Command has resigned as Chairman; Richard E. Broderick of the Public Buildings Service of the General Services Administration has been named as the new Chairman. The new Chairman is in the process of selecting representatives of six agencies to assist him in establishing objectives and plans for the Subcommittee. Mr. Rogers gave a presentation at a building community metric symposium on December 2, 1981, sponsored by the National Institute of Building Sciences and other organizations in Chicago. The presentation focused on Federal Government metrication policy and structure and the willingness of agencies to work with the building industry in any voluntary metrication efforts.

Consumer Affairs

Charles R. Cavagnaro of the Office of Consumer Affairs is the Chairman. Several planning meetings have been held to determine how best to activate the Subcommittee.

Federal Employee Training

Gene Bennett of the Office of Personnel Management has been serving as the Chairman of this Subcommittee. He has met with the Steering Committee of the Interagency Advisory Group and Committee on Development and Training as a first step in establishing the Subcommittee. The Steering Committee felt in mid-1980 that the agencies must identify organization and individual metric training needs before the Subcommittee can be effective. Organization of the Subcommittee will take place when the needs are clearly defined.

Fuel and Power

There is no chairman and the Subcommittee is inactive.

Legislation and Regulations

An MOC planning meeting has determined that a Legislation and Regulations Subcommittee is needed to raise the level of awareness among Federal Agencies as to the potential impact of laws and regulations on the metrication process and to help eliminate legal barriers to voluntary metric conversion. Daniel B. Peyser, General Counsel of the U.S. Metric Board, has agreed to chair the Subcommittee until it is organized and operating. The General Counsel's offices of nine Federal Agencies have been asked to name representatives to serve on a task force that will recommend to the MOC the organization, direction, and goals of the Subcommittee.

Metric Practices and Preferred Units Subcommittee

Chairman David T. Goldman of the Department of Commerce stated that the Subcommittee has been working in three areas. On January 30, 1981, the Subcommittee met with the ICSP Metric Standards Subcommittee to develop a recommended Federal position on the development of a single national metric practice standard to serve as an update to the American National Standard Z210.1-1976. The Subcommittee is also helping to get a consensus on the factor for converting gallons of motor fuel into liters, at the request of the National Conference on Weights and Measures. Finally, it has developed the "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units (SI)" (previously mentioned under Resolution on Press Releases and Conversion Guidelines).

MOC Information Working Group

Hollis Vail of the Department of the Interior has informally chaired this committee. The group is discussing the issue of what types of information is needed by the MOC. Federal managers need to know the status of metric conversion in particular sectors of national activity. It has been difficult to obtain such information because no information base has existed containing such information, nor has there been a clearly identified way to obtain such information. The group recommended to the MOC that it ask agencies to identify areas in which they are "pre-eminant" and to name a contact person in each of those areas who is knowledgeable about metrication. The MOC Chairman on March 12, 1981, sent a memorandum to the MOC asking for addresses and telephone numbers of knowledgeable agency persons. A Federal Metric Information Referral Directory containing this information is being developed.

Procurement and Supply

The Subcommittee currently does not have a chairman and is inactive.

Public Education and Awareness

Herbert Jacobson of the Department of Education was named Chairman of the Subcommittee. He called a meeting of interested parties to request suggestions for agenda items for the first meeting of the Subcommittee. It was decided that the initial concern should be to define the Subcommittee's role and responsibilities. An information packet is being prepared for distribution to each of the Subcommittee members.

Transportation Subcommittee

Several planning meetings have been held to organize the Subcommittee. Chairman Byron Nupp of the Department of Transportation stated that the Subcommittee is in an agenda building stage and a meeting will probably be scheduled in mid-1981. He sees the Subcommittee as the conduit for developing and channeling Federal Agency metric transportation issues to the MOC and other interested parties, such as the USMB. The primary issues to be addressed by the Subcommittee appear to be (1) international and domestic tariffs, rates, and containers, (2) navigation and communication standards and policies, (3) highway engineering, signing, and mapping, and (4) technology transfer to transportation systems.

Brief History of the ICMP and MOC

Under the auspices of the Department of Commerce, the Metrication Subcommittee of the Interagency Committee on Standards Policy (ICSP) was formed in 1975 in response to increased metric activity in the private and government sectors. In 1976, the ICSP recommended the establishment of the ICMP, independent from the ICSP, to provide high-level policy and conversion guidance on metrication activities to Federal agencies.

Representatives of the U.S. Metric Board, the Department of Commerce, and the Office of Management and Budget concurred in early 1978 that the proposed ICMP should be formed and function under the auspices of the newly-formed U.S. Metric Board. The USMB passed a resolution at its August 18, 1978, meeting to approve the establishment of the ICMP as specified in a proposed charter.

On October 18, 1978, members-designate from interested Federal Agencies approved the proposed charter, thus creating the ICMP. Also at this meeting, the ICMP accepted an offer from the Department of Commerce to transfer the ICSP Metrication Subcommittee to the ICMP, to become the Metrication Operating Committee.

Information on ICMP activities from October 18, 1978, through January 1980 is contained in the "First Annual Report to the U.S. Metric Board, Interagency Committee on Metric Policy." (Copies of this report can be obtained by contacting the Federal Program, U.S. Metric Board.)

MEMBERS OF THE INTERAGENCY COMMITTEE ON METRIC POLICY

Members as of June 1980	Members as of November 1981 (if different from June 1980)
Department of Agriculture	
Mr. Howard W. Hjort, Director Economics, Policy Analysis, and Budget Office of the Secretary Department of Agriculture Room 214-A Washington, D.C. 20350 (202) 447-5681	Mr. William G. Lesher Assistant Secretary for Economics Department of Agriculture Room 227E Washington, DC 20250 (202) 447-4164
Department of Commerce	
Dr. Jordan J. Baruch Assistant Secretary for Science and Technology Department of Commerce Room 3862 Washington, D.C. 20230 (202) 377-3111	Dr. Ernest Ambler Director, National Bureau of Standards Department of Commerce Washington, DC 20234 (202) 921-2411
Department of Defense	
Mr. Dale W. Church Deputy Under Secretary for Acquisition Policy, Defense Research and Engineering Department of Defense The Pentagon, Room 3E144 Washington, D.C. 20301 (202) 695-7145	Mr. William A. Long Deputy Under Secretary for Acquisition Management Department of Defense The Pentagon, Room 3E144 Washington, DC 20301 (202) 695-7145
Department of Energy	
Ms. Ruth C. Clusen Assistant Secretary for Environment Department of Energy Washington, D.C. 20580 (202) 376-4185	Mr. William Vaughan Assistant Secretary for Environmental Protection Safety and Emergency Preparedness Department of Energy 100 Independence Avenue, SW Room 4G084 Washington, DC 20585 (202) 252-4700

ICMP members of June 1980	ICMP members as of November 1981 (if different from June 1980)
Department of Health and Human Services	
Mr. Gerald H. Britten Deputy Assistant Secretary for Program Systems Department of Health and Human Services 220 Independence Avenue, S.W. Washington, D.C. 20201 (202) 245-1863	
Department of Housing and Urban Development	
Mr. Lawrence B. Simons Assistant Secretary for Housing Department of Housing and Urban Development 451 7th Street, S.W. Room 9100 Washington, D.C. 20410 (202) 755-6600	Mr. Philip D. Winn Assistant Secretary for Housing Department of Housing and Urban Development 451 7th Street, S.W. Room 9100 Washington, DC 20410 (202) 755-6600
Department of the Interior	
Mr. Larry Meierotto Assistant Secretary Policy, Budget and Administration Department of the Interior 18th and C Streets, N.W. Washington, D.C. 20240 (202) 343-6181	Mr. J. Robinson West Assistant Secretary for Policy, Budget, and Administration Department of the Interior 18th & C Streets, NW Washington, DC 20240 (202) 343-6181
Department of Labor	
Mr. Alfred M. Zuck Assistant Secretary for Administration and Management Department of Labor 200 Constitution Avenue, N.W. Washington, D.C. 20210 (202) 523-9086	

ICMP members as of June 1980	ICMP members as of November 1981 (if different from June 1980)
Department of State	
Mr. Thomas M. Tracy Assistant Secretary for Administration Room 6316 Department of State Washington, D.C. 20520 (202) 632-1492	
Department of Transportation	
Mr. William B. Johnston Assistant Secretary for Policy and International Affairs U.S. Department of Transportation Washington, D.C. 20590 (202) 426-4544	Mr. Judith T. Connor Assistant Secretary for Policy and International Affairs Department of Transportation Room 10228 Washington, DC 20590 (202) 426-4544
Department of the Treasury	
Mr. W. J. McDonald Assistant Secretary (Administration) Department of the Treasury Washington, D.C. 20220 (202) 566-5391	Ms. Cora Beebe Assistant Secretary for (Administration) Department of the Treasury Washington, DC 20220 (202) 566-5391
Central Intelligence Agency	
Mr. David Matthews Office of Logistics Plans and Program Staff Central Intelligence Agency Washington, DC 20505 (703) 281-8131	
Civil Aeronautics Board	
Mr. Samuel L. Brown Assistant Director for Statistical Planning Bureau of Accounts & Statistics Civil Aeronautics Board Washington, D.C. 20428 (202) 673-5148	Mr. Gerald Coffee Assistant Section Chief Data System Management Division, B46B 1825 Connecticut Avenue,NW Washington, DC 20428 (202) 673-5925

ICMP members as of June 1980	ICMP members as of November 1981 (if different from June 1980)
Commission on Fine Arts	
Mr. Charles H. Atherton Secretary, Commission on Fine Arts 708 Jackson Place, N.W. Washington, D.C. 20006 (202) 566-1066	
Commodity Future Trading Commission	
Mr. William A. Briggs Executive Assistant to the Chairman Commodity Futures Trading Commission 2033 K Street, N.W. Washington, D.C. 20581 (202) 254-7556	Mr. Marshall E. Hanbury Office of Governmental Affairs Commodity Futures Trading Commission 2033 K Street, N.W. Washington, D.C. 20581 (202) 254-6090
Community Services Administration*	
Mr. John Gabusi Assistant Director for Management Community Services Administration Washington, D.C. 20506 (202) 254-5330	
Consumer Product Safety Commission	
Mr. R. David Pittle Commissioner Consumer Product Safety Commission 1111 18th Street, N.W. Washington, D.C. 20207 (202) 634-7726	Mr. Don Clay Engineering Science Div. Consumer Product Safety Commission 5401 Westbard Avenue Bethesda, MD 20207 (202) 492-6720
Environmental Protection Agency	
Mr. Stephen J. Gage Assistant Administrator for Research & Development Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460 (202) 755-2600	Dr. Andrew P. Jovanovich Acting Assistant Administrator for Research & Development Environmental Protection Agency-Mail Code RD-672 Washington, DC 20460 (202) 755-2600

*The Community Services Administration was abolished as of September 30, 1981.

ICMP members of June 1980	ICMP members as of November 1981 (if different from June 1980)
Export-Import Bank of the United States	
Mr. Albert H. Hamilton Government Affairs Office Export-Import Bank of the United States 811 Vermont Avenue, NW-Room 1238 Washington, D.C. 20571 (202) 566-8853	
Federal Communications Commission	
Mr. Julian T. Dixon Chief, Research & Standards Div. Office of Chief Engineer Federal Communications Commission 2025 M Street, N.W. - Room 7202 Washington, D.C. 20554 (202) 632-7060	Mr. Robert Powers Chief, Research and Standards Division Office of Chief Engineer Federal Communications Commission 2025 M Street, NW-Rm. 7202 Washington, DC 20554 (202) 632-7060
Federal Maritime Commission	
Mr. Andrew H. Weissler Deputy Director Bureau of Industry Economics Federal Maritime Commission 1100 L Street, N.W. Washington, D.C. 20573 (202) 523-5863	Mr. Newton Frank Chief, Office of Financial Analysis Federal Maritime Commission 1100 L Street, N.W. Washington, DC 20573 (202) 523-5863
Federal Reserve Board	
Mr. John M. Denkler Staff Director for Management Federal Reserve Board Washington, D.C. 20551 (202) 452-3764	
Federal Trade Commission	
Mr. Albert H. Kramer Director Bureau of Consumer Protection Federal Trade Commission Washington, D.C. 20580 (202) 523-3727	Mr. James H. Sneed Director, Bureau of Consumer Protection Federal Trade Commission Washington, DC 20580 (202) 523-3727

ICMP members as of June 1980	ICMP members as of November 1981 (if different from June 1980)
General Services Administration	
Mr. Gerald McBride Assistant Administrator for Acquisition Policy General Services Administration 18th and F Streets, N.W., Room 6002 Washington, D.C. 20405 (202) 566-1043	
Government Printing Office	
Mr. Joseph A. Palank Director of Engineering U.S. Government Printing Office North Capitol & H Streets, N.W. Washington, D.C. 20401 (202) 275-2402	
Interstate Commerce Commission	
Mr. Martin E. Foley Director, Bureau of Traffic Interstate Commerce Commission Washington, D.C. 20423 (202) 275-7348	
Library of Congress	
Mr. Edmond L. Applebaum Associate Librarian for Management Library of Congress Washington, D.C. 20540 (202) 426-5560	Mr. Glenn Z. Zimmerman Associate Librarian for Management Library of Congress Washington, DC 20540 (202) 426-5560
National Aeronautics and Space Administration	
Mr. Walter C. Williams Chief Engineer Mail Code D-1 National Aeronautics and Space Administration Washington, D.C. 20546 (202) 755-3572	

ICMP members as of June 1980	ICMP members as of November 1981 (if different from June 1980)
Small Business Administration	
Mr. R. F. McDermott Associate Administrator for Procurement and Technical Assistance Small Business Administration 1441 L Street, N.W. Washington, D.C. 20416 (202) 653-6588	
Smithsonian Institution	
Mr. Paul Perrot Assistant Secretary for Museum Programs Smithsonian Institution Arts and Industries Bldg., Rm 2467 900 Jefferson Drive Washington, D.C. 20560 (202) 357-3125	
Tennessee Valley Authority	
Mr. Edward H. Lesesne Director Division of Water Resources Tennessee Valley Authority 448 Evans Building Knoxville, Tennessee 37902 (615) 632-3788	Dr. Ralph Brooks Director, Division Water Resources Tennessee Valley Authority 141 Evans Building Knoxville, TN 37902 (615) 632-6565
U.S. International Trade Commission	
Mr. Russell N. Shewmaker Senior Advisor U.S. International Trade Commission 701 E Street, N.W. Washington, D.C. 20436 (202, 523-0466	Mr. Norris A. Lynch Director, Office of Industries U.S. International Trade Commission 701 E. Street, NW Washington, D.C. 20436 (202) 523-0146

ICMP members as of June 1980	ICMP members as of November 1981 (if different from June 1980)
U.S. Postal Service Mr. M. E. Sorte Director Postal Technology Research Office Research & Development Laboratories U.S. Postal Service 11711 Parklawn Drive Rockville, Maryland 20852 (301) 443-6266	Mr. Adam Kegel Technical Consultant Postal Technology Research Office Research and Development Laboratories U.S. Postal Service 11711 Parklawn Drive Rockville, MD 20852 (301) 443-6266
Veterans Administration Mr. Clyde C. Cook Assistant Deputy Administrator for Procurement and Supply(90) Veterans Administration 810 Vermont Avenue, NW Washington, D.C. 20420 (202) 389-3808	
Office of Technology Assessment Mr. John C. Holmes Publishing Officer Office of Technology Assessment U.S. Congress 600 Pennsylvania Avenue, S.E. Washington, D.C. 20510 (202) 224-3827	Dr. Samuel Hale Office of Technology Assessment U.S. Congress 600 Pennsylvania Ave.,SE Washington, D.C. 20510 (202) 224-3827
Office of Science and Technology Mr. Philip Smith Office of Science & Technology Executive Office of the President Washington, D.C. 20500 (202) 395-6244	Mr. John Marcum Senior Advisor for Technology and Arms Control Office of Science and Technology Old Executive Office Bldg. Washington, DC 20500 (202) 395-6202
Office of Consumer Affairs Mrs. Esther Peterson Director, U.S. Office of Consumer Affairs The White House Washington, D.C. 20500 (202) 456-6590	(new ICMP member not appointed yet)

APPENDIX C

Members of the ICMP Metrication Operating Committee*

Members as of June 1980	Members as of November 1981 (if different from June 1980)
Department of Agriculture	
Mr. Robert A. Owen USDA Metric Coordinator Foreign Agriculture Service U.S. Department of Agriculture Room 4935 South Building Washington, D.C. 20250 (202) 447-2375	Mr. Richard J. Schrimper Department of Agriculture 4839 South Building Washington, DC 20250 (202) 447-6202
Department of Commerce	
Mr. David T. Goldman Associate Director for Long Range Planning National Measurement Laboratory National Bureau of Standards Washington, D.C. 20234 (301) 921-3304	
Department of Defense	
Mr. Howard B. Ellsworth OUSD(R&E)SS Department of Defense Room 2A318, The Pentagon Washington, D.C. 20310 (202) 695-7915	
Department of Education	
Mr. Herb Jacobson U.S. Department of Education 400 6th Street, S.W Room 1638 Washington, D.C. 20201 (202) 245-8275	Dr. Floyd Davis Director, Metric Education Program 400 Maryland Avenue, SW Donohoe Building, Rm. 3700 Washington, DC 20202 (202) 426-7220

*Members of the MOC are also Metric Coordinators of their agencies.

MOC members as of June 1980

MOC members as of November 1981
(if different from June 1980)

Department of Health and Human Services

Mr. George Grob
Director
Division of Planning and
Policy Coordination
Department of Health and
Human Services
Hubert H. Humphrey Bldg.
Room 447-D
Washington, D.C. 20201

(202) 245-7150

Department of Energy

Mr. Robert W. Poe
Operational and Environmental
Safety Division
EV-132
Department of Energy
Washington, D.C. 20545

(301) 353-5644

Department of Housing and Urban Development

Mr. Duane E. Keplinger
Director
Office of Architecture and
Engineering
Department of Housing and
Urban Development
451 7th Street, S.W.
Room 6162
Washington, D.C. 20410

(202) 755-5718

Mr. Donald K. Baxter
Director, Office of
Architecture and
Engineering Standards
Department of Housing and
Urban Development
451 7th Street, SW Rm 6170
Washington, DC 20410

(202) 755-5718

Department of the Interior

Mr. Hollis B. Vail
Office of Information Resources
Management
Department of the Interior
18th and C Streets, N.W.
Washington, D.C. 20240

(202) 343-7544

MOC members as of June 1980

MOC members as of November 1981 (if different from June 1980)

Department of Justice

Mr. J. Michael Clark
Chief, Material Policy Group
Property Management and
Procurement Staff
U.S. Department of Justice
Room 6309
Constitution Ave. & 10th St., N.W.
Washington, D.C. 20530

(202) 633-1052

Department of Labor

Mr. Jerry L. Purswell
Director
Safety Standards Program
Occupational Safety & Health
Administration
Department of Labor
Washington, D.C. 20210

(202) 523-8061

Mr. Donald E. Lemmon
Director, Management
Policy and Systems
Department of Labor S.5526
200 Constitution Avenue NW
Washington, DC 20210

(202) 523-6073

Department of State

Mr. Peter E. Gurvin
Engineering Branch
Office of Foreign Bldgs.(A/FBO)
Room 327, SA-6
Department of State
Washington, D.C. 20520

(202) 234-9508

Department of Transportation

Mr. Byron L. Nupp
Office of Intermodal
Transportation, P-10
Department of Transportation
400 7th Street, S.W.
Room 9416H
Washington, D.C. 20590

(202) 426-4447

MDC members as of June 1980	MDC members as of November 1981 (if different from June 1980)
Department of the Treasury	
Mr. George E. Meredith Property Utilization Officer Department of the Treasury Room 900, 1331 G Street, N.W. Washington, D.C. 20220 (202) 376-0921	Mr. Edward W. Brooks Director, Office of Administrative Programs Department of the Treasury Main Treasury - Room 2434 Washington, DC 20220 (202) 566-2881
Central Intelligence Agency	
Mr. David B. Matthews Plans and Programs Staff Office of Logistics Central Intelligence Agency Washington, D.C. 20505 (703) 281-8131	
Civil Aeronautics Board	
Mr. Samuel L. Brown Assistant Director for Statistical Planning Bureau of Accounts & Statistics Civil Aeronautics Board Washington, D.C. 20428 (202) 673-5148	Mr. Gerold Coffee Assistant Section Chief Data System Management Division, B46B Civil Aeronautics Board, 1825 Connecticut Ave., NW Washington, DC 20428 (202) 673-5925
Commission of Fine Arts	
Mr. Charles H. Atherton Secretary The Commission of Fine Arts 708 Jackson Place, NW Washington, DC 20006 (202) 343-5324	
Commodity Futures Trading Commission	
(No Member Appointed)	Mr. Marshall E. Hanbury Office of Governmental Affairs Commodity Futures Trading Commission 2033 K Street, N.W. Washington, D.C. 20581 (202) 254-6090

MOC members as of June 1980

MOC members as of November 1981
(if different from June 1980)

Community Services Administration*

Mr. Jack Stoehr
Office of Administration
Community Services Administration
1200 19th Street, N.W.
Room B436B
Washington, D.C. 20506

(202) 254-5300

Consumer Product Safety Commission

Mr. James I. Price
Director, Mechanical and Textile
Engineering Division
Consumer Product Safety
Commission
5401 Westbard Avenue, Room 900
Bethesda, Maryland 20207

(301) 492-6604

Environmental Protection Agency

Mr. Albert C. Trakowski
Principal Engineering Science
Advisor
Office of Research & Development
(RD-676)
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

(202) 426-2202

Dr. Courtney Riordan
Director, Office of
Monitoring Systems
and Quality Assurance
Office of Research and
Development
Environmental Protection
Agency
Washington, DC 20460

(202) 426-2202

Export-Import Bank of the United States

Mr. Albert H. Hamilton
Government Affairs Office
Export-Import Bank of the
United States
Washington, D.C. 20571

(202) 566-8853

*The Community Services Administration was abolished as of September 30, 1981.

MOC members as of June 1980	MOC members as of November 1981 (if different from June 1980)
Farm Credit Administration	
Mr. Paul C. Redmer Director, Administrative Division Farm Credit Administration 490 L'Efant Plaza, S.W. Washington, D.C. 20578 (202) 755-4394	
Federal Communications Commission	
Mr. Daniel R. Yates Office of Science and Technology Authorization and Standards Division Federal Communications Commission 2025 M Street, N.W. Washington, D.C. 20554 (202) 653-6288	
Federal Maritime Commission	
Mr. Andrew H. Weissler Deputy Director Bureau of Industry Economics Federal Maritime Commission 1100 L Street, N.W. Washington, D.C. 20573 (202) 523-5863	Mr. Newton Frank Chief, Office of Financial Analysis Federal Maritime Commission 1100 L Street, NW Washington, DC 20573 (202) 523-5873
Federal Reserve Board	
Mr. Robert J. Zemel Assistant Director Division of Data Processing Federal Reserve Board Washington, D.C. 20551 (202) 452-2801	
Federal Trade Commission	
Mr. Albert H. Kramer Director Bureau of Consumer Protection Federal Trade Commission Washington, D.C. 20580 (202) 523-3727	Mr. Fredrick McChesney Assistant Director for Policy and Evaluation Bureau of Consumer Protection Federal Trade Commission Washington, DC 20480 (202) 523-3868

MOC members as of June 1980

MOC members as of November 1981
(if different from June 1980)

General Services Administration

Mr. Michael N. Zabych
Office of Acquisition Policy
General Services Administration
19th and E Streets, N.W., Room 6014
Washington, D.C. 20406

(202) 566-1574

Government Printing Office

Mr. Joseph A. Palank
Director of Engineering
U.S. Government Printing Office
North Capitol & H Streets, N.W.
Washington, D.C. 20401

(202) 275-2402

International Communications Agency

Mr. Robert P. Walker
Management Analyst
International Communications
  Agency
Washington, D.C. 20547

(202) 523-4308

Mr. Charles N. Canestro
Management Analyst
International Communications Agency
Washington, D.C. 20547

(202) 523-4308

Interstate Commerce Commission

Mr. Martin E. Foley
Director, Bureau of Traffic
Interstate Commerce Commission
Washington, D.C. 20423

(202) 275-7348

Library of Congress

Mr. Floyd D. Hedrick
Chief, Procurement and Supply
  Division
Library of Congress
1701 Brightseat Road
Landover, Maryland 20785

(202) 287-8605

MOC members as of June 1980

MOC members as of November 1981
(if different from June 1980)

National Aeronautics and Space Administration

Mr. James M. Spears
Technical Assistant to the
Chief Engineer
Code D-1
National Aeronautics and
Space Administration
Washington, D.C. 20546

(202) 755-3327

Mr. William E. McInnis
National Aeronautics and
Space Administration
Code D
Washington, DC 20546

(202) 755-3200

National Labor Relations Board

Mr. Paul E. Long
Deputy Director of Administration
National Labor Relations Board
Washington, D.C. 20570

(202) 254-9200

Nuclear Regulatory Commission

Mr. Laurids Porse
Office of Standards Development
Nuclear Regulatory Commission
Washington, D.C. 20555

(202) 443-6927

Security and Exchange Commission

Mr. Richard J. Kanyan
Director
Office of Administrative Services
Securities and Exchange Commission
Washington, D.C. 20549

(202) 523-5980

Small Business Administration

Mr. Andrew C. Luff
Small Business Administration
1441 L Street, N.W., Room 523
Washington, D.C. 20416

(202) 653-6458

Mr. Roger Hanson
Office of Technology Assistance
Small Business Administration
1441 L Street, NW, Rm. 630
Washington, DC 20416

(202) 653-6586

MOC members as of June 1980	MOC members as of November 1981 (if different from June 1980)
Smithsonian Institution	
Mr. Paul Perrot Assistant Secretary for Museum Programs Smithsonian Institution Arts and Industries Building Room 2467 900 Jefferson Drive Washington, D.C. 20560	
Tennessee Valley Authority	
Mr. Edward H. Lesesne Director, Division of Water Resources Tennessee Valley Authority 448 Evans Building Knoxville, Tennessee 37902 (615) 632-3788	Mr. Ralph H. Brooks Tennessee Valley Authority 141 Evans Building Knoxville, Tennessee 37902 (615) 632-3788
Office of Personnel Management	
Mr. Gene Bennett Office of Personnel Management 1121 Vermont Avenue, N.W. Room 200 Washington, D.C. 20415 (202) 653-6175	
U.S. International Trade Commission	
Mr. Norris A. Lynch Director, Office of Industries U.S. International Trade Commission Washington, D.C. 20436 (202) 523-0146	
U.S. Postal Service	
Mr. M. E. Sorte Director Postal Technology Research Office Research and Development Laboratories U.S. Postal Service 11711 Parklawn Drive Rockville, Maryland 20852 (301) 443-6266	Mr. Adam Kegel Technical Consultant Postal Technology Research Office Research and Development Laboratories U.S. Postal Service 11711 Parklawn Drive Rockville, MD 20852 (301) 443-5311

MOC members as of June 1980

MOC members as of November 1981
(if different from June 1980)

Veterans Administration

Mr. John W. Marshall
Chief Quality Assurance Specialist
Procurement Division
Supply Service (93C)
Veterans Administration
Washington, D.C. 20420

(202) 389-3313

Office of Technology Assessment

Mr. John C. Holmes
Publishing Officer
Office of Technology Assessment
Washington, D.C. 20510

(202) 224-3827

Dr. Samuel Hale
Office of Technology Assessment
U.S. Congress
Washington, DC 20510

(202) 224-3827

Office of Consumer Affairs

Mr. Charles R. Cavagnaro
Office of Consumer Affairs
1009 Premier Building
1725 Eye Street, N.W.
Washington, D.C. 20201

(202) 634-4183

U.S. Metric Board

Mr. Stanley R. Parent
Director
Research, Planning and Coordination
U.S. Metric Board
1600 Wilson Boulevard, 4th Floor
Arlington, Virginia 22209

(703) 235-2583

PROBABLE WORKLIST FOR FY-81
INTERAGENCY COMMITTEE ON METRIC POLICY

The ICMP addresses and resolves metrication issues at the need-level of the Federal agencies rather than in accordance with an "accomplishment schedule." Completion dates are dictated primarily by "urgency" and priorities constantly shift as agency needs shift. Listed below are items which were dealt with by the ICMP/MOC during Fiscal Year 1981.

Metrication Policy

- Publish a "final" Policy and Guidelines in the Federal Register.
- Investigate the need for further formalization of Policy and Guidelines.
- Encourage each agency to follow Policy and Guidelines, and to adopt formal agency policy and structure.
- Provide assistance to the U.S. Metric Board, as requested by the USMB, in fulfilling its requirement to develop a Federal Plan.

Increase Knowledge of Agency Metrication

- Set up an experimental functioning computer-based metric information system.
- Define specific types of information to be included in the system.
- Define the need for status reports.
- Develop an expanded ICMP Annual Report.

Cooperate with the Private Sector

- Work with agencies to increase Federal representation on private sector committees in accordance with the Federal Agency Participation Guidelines.

Organize MOC Subcommittee Programs

- Develop a Federal position on ANMC Construction Plan.

- o Develop subcommittee objectives and active programs for Construction, Procurement and Supply, Transportation, and Consumer Affairs Subcommittees.
- o Encourage agencies to name representatives to Subcommittees in accordance with Guidelines for Participation on Subcommittees.

Specific Metrication Actions

- o Obtain ICMP approval of Press Release Resolution; encourage agency implementation of Resolution.
- o Identify and attempt to resolve real-life private sector/state issues.
- o Work toward Federal position on a single National Metric Practice Standard.

APPENDIX E

federal register

Thursday,
April 30, 1981

Part V

Interagency Committee on Metric Policy

Federal Metric Policy and Guidelines; Notification of "Metric Conversion Policy for Federal Agencies" and "Federal Agency Guidelines for Implementation of Metric Conversion Policy"

Metric Conversion Policy for Federal Agencies

Purpose

The purpose is to state for Federal agencies a policy for dealing with the increasing use of the metric system within the Federal Government, with consideration of voluntary conversion in the state and local governments, and the private sector. The metric system, for the purpose of this document, means the International System of Units as established by the General Conference on Weights and Measures in 1960 and as interpreted or modified for the United States by the Secretary of Commerce.

This authority of the Secretary of Commerce is derived from the *Metric Conversion Act of 1975* and the *Metric Education Act of 1978*. (National Bureau of Standards publication NBS LC 1078, revised November 1977, contains this interpretation and modification and may be obtained from the Office of Technical Information, National Bureau of Standards, Washington, D.C. 20234.)

Background

When the Act of July 28, 1866 (14 Stat. 339; 15 U.S.C. 204–6) was adopted, the use of the metric system was legalized throughout the United States. On May 20, 1875, the United States ratified the *Treaty of the Meter* (20 Stat. 709), which provided for an International Bureau for Weights and Measures, an International Committee for Wights and Measures, and a General Conference on Weights and Measures. In recognition of the fact that the International System (SI), as defined by the General Conferences on Weights and Measures since 1960, has now become the internationally accepted system for weights and measures, many sectors of the United States have already started metrication. On December 23, 1975, the President signed the *Metric Conversion Act of 1975* (Public Law 94–168; 15 U.S.C. 205a, which (1) declared that the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States, and (2) established the U.S. Metric Board to coordinate the volunatry conversion to the metric system.

Policy Statement

Federal agencies shall conduct their metrication activities in a coordinated manner consistent with the objectives of the Metric Conversion Act and compatible with metric conversion trends in the Nation. (Section 3 of the Act declares that the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States.) Federal agencies shall encourage and support an environment which can accommodate metrication and when taking initiatives, will act with consideration for metrication in the state and local governments and the private sector. Each Federal agency shall develop plans, allocate sufficient resources, and take actions to:

1. Actively undertake coordination and planning for metric conversion, taking into account the interests, views, and conversion plans of other Federal agencies, state and local governments, and affected parties in the private sector.

2. Identify the areas where metrication is dependent upon the agency's initiative and take action which reflects the needs of the United States and which does not unduly restrict competition.

3. Identify the areas where metrication is dependent upon initiatives outside the agency which impact the agency and take appropriate internal action.

4. Maximize benefits and minimize costs in areas impacted by the agency's program.

5. Increase the public understanding of, and participation in, metrication activities in agency programs.

6. Identify problems associated with metrication activities in areas impacted by the agency's programs, and appropriately assist in the resolution of these problems.

Each agency shall:

1. Establish the necessary guidelines and structure to adequately carry out the policy.

2. Designate a key executive with the authority to establish intra-agency policies for metrication and to represent and speak for the agency in interagency forums.

3. Identify, on a continuing basis, measurement-sensitive policies and procedures for which it is responsible, and prepare new or revised regulations, standards, specifications, procurement policies, and, if appropriate, legislative proposals, to remove barriers to metric conversion.

Federal Agency Guidelines For Implementation of Metric Conversion Policy

These guidelines are to be used to support and implement the metric conversion policy for agencies of the Federal Government. The intent is to clarify the basic Federal policy and assist in the development and coordination of cost-effective metrication activities and programs. The metric system, for the purpose of this document, means the International System of Units as established by the General Conference on Weights and Measures in 1960, and as interpreted or modified for the United States by the Secretary of Commerce. This authority of the Secretary of Commerce is derived from the Metric Conversion Act of 1975 and the Metric Education Act of 1978. (National Bureau of Standards publication NBS LC 1078, revised November 1977, contains this interpretation and modification and may be obtained from the Office of Technical Information, National Bureau of Standards, Washington, D.C. 20234.)

1. Each agency shall develop a capability to identify and to implement metric conversion initiatives including the associated timeframes for their initiation and completion. This shall include the capability for coordination with other agencies.

2. The allocation of agency resources for metric implementation should be accepted as part of the ongoing activities of the agency.

3. Each agency shall immediately establish practices that raise its employees' awareness and understanding of agency metric policy and practices.

4. Each agency shall develop education and training plans, as applicable, in metric usage.

5. Each agency shall adopt metric units and practices when in the public interest.

6. When the private sector has a capability to provide metric products or services at reasonable or competitive cost, the agency will, at the earliest possible time, consider the acquisition and use of such metric products or services to the maximum extent permitted by existing law and policy. Small business capability will be considered in development of agency policies and procedures, as required by Federal law.

7. Each agency's use of the metric system in its activities and products shall be consistent with statutory (such as, Federal labor-management policy), operational, economic, technical, and safety considerations. Each agency shall include such considerations as an integral part of its metrication activities.

8. Each agency, recognizing the long-term nature of the public acceptance process, shall immediately begin to develop and implement plans for involving, informing, and educating the various publics affected by the specific metrication activities under way in the agency's programs. Included shall be:

a. Information on conversion activities.

b. The schedule of such conversions.

c. The justification of the conversions.

d. Provision for a mechanism to assure public participation and comment.

e. Explanation of the applicable metric units and practices.

f. The progress of conversion.

9. Each agency shall provide representatives, advisors, and/or participants to metrication groups in the private sector, as appropriate, in order to monitor and/or coordinate agency activities with private sector planning.

10. Each agency shall recognize the Interagency Committee on Metric Policy (ICMP) as the policy-coordinating group for the Federal Government, and that the ICMP representatives are expected to be able to speak for their respective agencies on metric policy matters.

11. Each agency shall designate an Agency Metric Coordinator, who shall serve as a member of the Metrication Operating Committee (MOC). The agency shall also appoint, as appropriate, agency individuals to actively participate in the activities of the various MOC subcommittees.

Dated: April 27, 1981.

Howard B. Ellsworth,

Chairman, Metrication Operating Committee of the ICMP.

[FR Doc. [illegible] Filed [illegible]]

BILLING CODE [illegible]

APPENDIX G.6

DEPARTMENT OF DEFENSE (DOD) DIRECTIVE 4120.18, JANUARY 28, 1980

January 28, 1980
NUMBER 4120.18

Department of Defense Directive USDRE

SUBJECT: Metric System of Measurement

References:
(a) DoD Directive 4120.18, "Use of the Metric System of Measurement," December 10, 1976 (hereby canceled)
(b) Metric Conversion Act of 1975, Title 15, United States Code, Section 205a-k (Public Law 94-168)
(c) DoD Directive 5000.2, "Major System Acquisition Process," January 18, 1977
(d) American Society for Testing and Materials E380 (also numbered ANSI Z210.1 and IEEE Std 268) Standard for Metric Practice, DoD Index of Specifications and Standards

A. REISSUANCE AND PURPOSE

This Directive reissues reference (a) to reflect organizational responsibilities for the implementation and management of the metrication system of measurement within the Department of Defense, and to establish the Metrication Steering Group.

B. APPLICABILITY

The provisions of this Directive apply to the Office of the Secretary of Defense, the Joint Chiefs of Staff, the Military Departments, and the Defense Agencies (hereafter referred to as "DoD Components").

C. BACKGROUND

1. Reference (b) establishes a national policy of coordinating the use of the Metric System in the United States. To comply with that policy, the Department of Defense must establish guidelines and procedures to ensure that conversion from the U.S. Customary System of weights and measures (inch-pound) to the Metric System shall be accomplished with minimum cost and disruption of operations.

2. Use of the Metric System shall promote interchangeability and interoperability of equipment and materiel with our allies, facilitate joint military production programs, and simplify supply operations.

3. DoD Components shall keep pace with industry by using metric items when commercially available and economically and technically practicable.

D. POLICY

1. It is the policy of the Department of Defense to consider the use of the Metric System in all of its activities, consistent with operational, economical, technical, and safety requirements.

2. The Metric System shall be used in all new designs, unless such use is not in the best interest of the Department of Defense. In the latter instance, justification shall be documented. Adoption of the Metric System shall also be considered in the acquisition of supplies and services. In general, DoD Components shall adopt the Metric System in:

a. Developing materiel to be used jointly with the North Atlantic Treaty Organization (NATO) and other allied nations.

b. Developing military materiel that has potential for significant foreign sales or multinational joint acquisition programs.

c. Areas where industry has made significant progress in the design and production of metric products.

d. Areas where defense-industry preparedness or defense production readiness may be enhanced.

e. Areas that offer an economical, operational, or other advantage, or where no disadvantage is incurred.

E. OBJECTIVES

1. Physical and operational interfaces between metric items and inch-pound items shall be designed to ensure that interchangeability and interoperability shall not be adversely affected.

2. Existing designs dimensioned in inch-pound units shall be converted to metric units only if determined to be necessary or advantageous. Unnecessary retrofit of existing systems with new metric components shall be avoided when both the metric and inch-pound components are interchangeable and interoperable. Normally, the measurement units in which a system is originally designed shall be retained for the life of the system.

3. During the metric transition phase, use of hybrid metric and inch-pound designs may be necessary and will be acceptable. Materiel components, parts, subassemblies, and semifabricated materials that are of commercial design shall be specified in metric units when economically

available and technically adequate, or when it is otherwise specifically determined to be in the best interest of the Department of Defense. Bulk materials shall be specified and accepted in metric units when expediency and economy dictates.

4. Defense Systems Acquisition Review Council (DSARC) reviews and associated Decision Coordinating Papers (DoD Directive 5000.2 (reference (c))) shall address the use of metric units of measurement or reasons for their nonuse.

5. Technical reports, studies, and position papers (except those pertaining to items dimensioned in inch-pound units) shall include metric units of measurement in addition to or in place of inch-pound units. With respect to existing contracts, this requirement applies only if such documentation can be obtained without an increase in contract costs.

6. Programing and budgeting actions shall include resources required to support the DoD effort in converting to the use of metric units. Use of the Metric System shall be identified, justified, and planned so that costs can be included in the budget cycle on an orderly basis.

7. The Department of Defense shall use the Metric System of the International System of Units (SI) described by the American Society for Testing and Materials, E-380 (reference (d)).

8. To the extent that there is DoD interest, representatives shall participate in the development of national and international standards using the Metric System. NATO and other international metric standards shall be used to the maximum practical extent. However, if a U.S. standard is established with greater definition and restriction than the international standard, the U.S. standard shall be used.

9. Emphasis shall be placed on converting or developing specifications, standards, and other general-purpose technical data to keep pace with overall metric conversion activity. When a military item has no commercial counterpart, the developing agency shall assume a leadership role in developing the applicable metric document when the need arises.

10. When purchasing new shop and laboratory equipment, DoD Components are encouraged to specify features that will allow direct measurement of metric units or both metric and inch-pound units. Use of conversion kits is also encouraged.

11. Training in metric practices and usage shall be provided to personnel whose duties require such knowledge.

12. Use of dual dimensions (such as both metric and inch-pound dimensions on drawings) shall be avoided, unless it is determined in specific instances that such usage is beneficial. The use of tables on documents to translate dimensions from one system of measurement to the other is acceptable.

F. RESPONSIBILITIES

1. The Under Secretary of Defense for Research and Engineering, or designee, shall:

a. Provide direction and guidance in the application and use of the metric system of measurement.

b. Establish the DoD Metrication Steering Group to plan and coordinate the Department of Defense's conversion to the metric system, and to advise DoD Components on matters relating to metrication.

2. The Heads of DoD Components shall:

a. Appoint a person or establish an office to coordinate metric activities.

b. Designate a primary and alternate person to represent the DoD Component on the DoD Metrication Steering Group.

c. The Defense Logistics Agency shall provide the Executive Secretariat to the DoD Metrication Steering Group.

G. EFFECTIVE DATE AND IMPLEMENTATION

This Directive is effective immediately. Forward one copy of implementing documents to the Under Secretary of Defense for Research and Engineering within 120 days.

W. Graham Claytor

W. Graham Claytor, Jr.
Deputy Secretary of Defense

APPENDIX G.7

DEPARTMENT OF DEFENSE (DOD) INSTRUCTION 4120.23, MAY 18, 1981

May 18, 1981#
NUMBER 4120.23

Department of Defense Instruction

USDR&E

SUBJECT: DoD Metrication Plan

References:
(a) DoD Directive 4120.18, "Metric System of Measurement," January 28, 1980
(b) Title 15, United States Code, Section 205a-K, Public Law 94-168, Metric Conversion Act of 1975
(c) DoD Directive 2010.6, "Standardization and Interoperability of Weapon Systems and Equipment within the North Atlantic Treaty Organization," March 5, 1980
* (d) DoD Instruction 5000.2, "Major System Acquisition Procedures," March 8, 1983 *
(e) DoD 4120.3-M, "Defense Standardization and Specification Program Policies, Procedures and Instructions," August 1978, authorized by DoD Directive 4120.3, February 10, 1979

A. PURPOSE

This Instruction establishes the DoD Metrication Plan, which serves as a basis for decisionmaking regarding metrication; and provides a means to ensure that the metric system of measurement is considered for application throughout the Department of Defense.

B. APPLICABILITY

The provisions of this Instruction apply to the Office of the Secretary of Defense, the Military Departments, the Organization of the Joint Chiefs of Staff, and the Defense Agencies (hereafter referred to as "DoD Components"). The term "Military Services," used herein, refers to the Army, Navy, Air Force, and Marine Corps.

C. POLICY

The DoD Metrication Plan (enclosure 1) shall be used to ensure that the international system of metric measurement, known as SI, is applied uniformly within the Department of Defense, in accordance with reference (a).

D. RESPONSIBILITIES

1. The Under Secretary of Defense for Research and Engineering, or
* designee, the Deputy Under Secretary of Defense for Acquisition Management *
* (DUSD(AM)), shall initiate actions, as required, to ensure an effective and *
economical transition from the customary U.S. system of weights and measures (inch-pound) to the metric system of measurement, consistent with the needs of the Department of Defense and the capabilities of U.S. industry.

#(Ch 1 (REPRINT), March 22, 1983)

* 2. The Heads of DoD Components shall advise the DUSD(AM), through the DoD Metrication Steering Group (MSG), on actions pending and completed. *

3. The DoD Metrication Steering Group (MSG) shall amend the DoD Metrication Plan, as required, including the addition or deletion of tasks. The amended plan shall be issued periodically and identified as enclosure 1 to this Instruction.

F. EFFECTIVE DATE AND IMPLEMENTATON

This Instruction is effective immediately. Forward one copy of implementing documents to the Under Secretary of Defense for Research and Engineering within 120 days.

Wade

James P. Wade, Jr.
Principal Deputy
Under Secretary of Defense for
Research and Engineering

Enclosure - 1
DoD Metrication Plan

#(Ch 1 (REPRINT), March 22, 1983)

DoD METRICATION PLAN

A. INTRODUCTION

1. Background

a. The passage of the Metric Conversion Act of 1975, Pub. L. 94-168 (reference (b)), underscores the fact that the United States will join other industrial nations in the use of the metric system as the predominant form of measurement. This conversion will have a significant effect on the Department of Defense.

b. In late 1973, the Metrication Panel of the Defense Materiel Specifications and Standards Board (DMSSB) was established to formulate standardization actions needed to facilitate metric conversion. An interim policy was issued in June 1975, and was later promulgated as DoD Directive 4120.18 (reference (a)).

c. DoD policy provides that the Department of Defense should generally keep pace with industry conversion. Existing inch-pound designs should not be converted unless necessary or advantageous, and the metric system shall be considered in all new designs, with justification given if the metric system is not used.

2. Purpose and Scope. The DoD Metrication Plan serves as a management tool for decisionmaking at all levels of participation within the Department of Defense. Effective management of metrication activities within the Department of Defense is dependent upon the development, coordination, and implementation of the plan. The plan shall be kept current by the DoD MSG and implemented by the designated action offices. The tasks listed in the plan provide a smooth transition from inch-pound units to metric units at minimum cost and disruption of operations. These tasks represent current efforts and may be expanded and revised, as appropriate.

B. SUMMARY OF THE DoD METRICATION PLAN

1. Implementation of the Metric System in the Department of Defense. The principal means for introducing the metric system in the Department of Defense is by incorporating metric units in new designs, as provided for in reference (a). Existing designs dimensioned in inch-pound units shall be converted to metric units only if such conversion is necessary or advantageous. Unnecessary retrofit of existing systems or materiel with new metric components shall be avoided when both metric and inch-pound components are interchangeable and interoperable. Normally, the measurement units in which a system is orginally designed shall be retained for the life of the system. The metric system shall be used by the Department of Defense in all of its activities, consistent with operational, economical, technical, and safety requirements.

2. Organizational Responsibilities. Responsibilities for the DoD Metrication Plan lie with the ODUSD(AM), and specifically with the Deputy Director for Standardization and Support. A DoD MSG has been established to advise the Deputy Under Secretary of Defense. This group is composed of designated action officers from the DoD Components (see reference (a)). *

#(Ch 1 (REPRINT), March 22, 1983)

3. Interagency Coordination

a. U.S. Metric Board (USMB). The USMB was established by the U.S. Metric Conversion Act (reference (b)) to coordinate the increasing voluntary use of the metric system throughout the United States.

b. Interagency Committee on Metric Policy (ICMP). The ICMP provides for high-level coordination between federal government agencies. It functions under the auspices of the U.S. Metric Board to synchronize the use of metric measurements in the federal government. The DoD representative on this committee * is the DUSD(AM). The Metrication Operating Committee (MOC) undertakes tasks assigned by the ICMP. The MOC, the working arm of the ICMP, has established subcommittees for specific functional areas. Representatives from DoD Components participate in the activities of the MOC and its subcommittees. *

c. American National Metric Council (ANMC). The U.S. private sector has a role in the coordinated transition to the use of metric measurements. Its needs and capabilities must be considered with those of the federal government. The ANMC is the most significant representative of private interests, plans, and conversion actions. Federal agencies, including the Department of Defense, work closely with the ANMC to facilitate the exchange of ideas, plans, and methods needed to fulfill the intent of (reference (b)).

d. North Atlantic Treaty Organization (NATO). DoD Directive 2010.6 (reference (c)) provides policy and responsibilities for standardization and interoperability of weapons systems and equipment within NATO. It requires the use of the metric system of measurement when it is consistent with operational requirements and is in the best interests of the Department of Defense. DoD representatives participating on international bodies are responsible for ensuring that use of the metric system complies with DoD policy.

C. DoD METRICATION PLAN TASKS. The specific tasks on the following pages constitute the current identified actions required to implement the DoD Metrication Plan.

Task Identification. MET-1

Title. Establish criteria for determining which systems and equipment should be designed with metric units.

Problem. DoD Directive 4120.18 (reference (a)) requires that the metric system be considered in all new designs, be addressed at Defense Systems Acquisition Review Council, and be discussed in the Integrated Program Summary of DoD Directive 5000.2 (reference (d)) under technology assessment. However, there is no guidance on which factors should be evaluated in making this decision. Factors may include the extent to which the affected industry has been converted; the availability of key standards and specifications; the cost of metric as against inch-pound design on a short- and long-term basis; the inherent advantages of metric use, considering that metric will be the predominant measurement system in the future; and possible development or production delay, potential for NATO use, or potential for foreign production. Of extreme importance, is the ability or limitations that must be considered in the interoperability of metric-dimensioned end items to function with inch-pound equipment. It is imperative that metric communications, command, control, and intelligence (C^3I) sensor data equipment be interoperable with inch-pound interface equipment without degradation in performance.

Purpose. To develop a military handbook to aid program managers and other DoD Components involved in acquisition in determining when and whether to use the metric system in new designs.

Action Office. U.S. Army Materiel Development and Readiness Command (DARCOM).

Schedule:

	Target	Actual
Initiate	August 1980	August 1980
Complete	December 1983	

Task Identification. MET-2

Title. Develop guidelines for monitoring conversion schedules in major industrial commodity sectors.

Problem. Unnecessary costs could be incurred if the Department of Defense establishes metric requirements out of place with industrial capabilities. A network of private sector committees has been formed to develop coordinated conversion plans in designated private sectors. Additionally, the U.S. Metric Board is expected to generate activity in related areas.

Purpose. Assign DoD advisors and representatives to private sector groups to monitor planning, scheduling, and implementing activities. Establish a periodic information exchange between the DoD sector advisors and the DoD MSG.

Action Office. DoD MSG.

Schedule:

	Target	Actual
Initiate	September 1977	September 1977
Complete	Continuous	

Task Identification. MET-3

Title. Develop specific procedures for participation in government interagency metric policy committees and subcommittees.

Problem

a. The ICMP and its supporting MOC have been established to coordinate and plan metric conversion in the federal government.

b. Since metrication impacts upon many areas in the federal government, it is the purpose of the MOC to undertake tasks assigned to it by the ICMP and recommend solutions to overcome or avoid problems. Assisting in this effort are MOC subcommittees (such as transportation, acquisition, and supplies) with representatives from interested federal agencies.

Purpose. Assign DoD representatives to MOC subcommittees and provide them with guidelines and procedures for their participation. Establish a periodic information exchange between the DoD MSG members and MOC subcommittee representatives.

Action Office. DoD MSG.

Schedule:

	Target	Actual
Initiate	September 1977	September 1977
Complete	Continuous	

Task Identification. MET-4

Title. Develop a DoD metric training program.

Problem. Within the Department of Defense, little training or education in metrics has been implemented. Educational materials are available and were screened for appropriateness. Experts in the field agree that timing is important for a meaningful, cost effective, and uniform DoD indoctrination and training program.

Purpose. Investigate the need for a DoD metric training program (including specialized and individual training) that can be adapted to the particular needs of the DoD Components. If it is determined that a standardized training program is feasible and cost effective, prepare and implement a plan to develop such a program.

Action Office. Deputy Assistant Secretary of Defense (Program Integration), Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics) (OASD(MRA&L)).

Schedule:

	Target	Actual
Planning	May 1981	May 1981
Implementation	July 1982	July 1982

The Deputy Assistant Secretary of Defense (Program Integration), OASD(MRA&L), reported to the Metrication Steering Group (MSG) that MET-4 had been completed. The action office reported that DoD training activities have incorporated metric training on an "as needed" basis in established training curriculum. On July 9, 1982, the DoD MSG approved the recommendation that no separate metric training program be developed. Though completed, this task shall remain herein for record and continuity purposes.

Task Identification. MET-5

Title. DoD workshop seminars.

Problem. DoD Directive 4120.18 (reference (a)) provides guidance for implementation and management of the DoD Metrication Plan. Thus far, the corporate knowledge of metrication efforts within the Department of Defense has been limited. To broaden the information base, periodic workshops and seminars are beneficial. This forum shall serve to publicize recent efforts, and provide an opportunity for the ultimate users to express problems and evaluate efforts.

Purpose. To develop a program for future metrication workshops and seminars to be conducted on an "as required" basis.

Action Office. DoD MSG.

Schedule:

	Target	Actual
Initiate	August 1979	August 1979
Initial Seminar (Phase I)	June 1980	June 1980
Initial Seminar (Phase II)	November 1980	November 1980
Follow-on Seminars	As required	

Task Identification. MET-6

Title. Impact of metric conversion on supply and maintenance.

Problem

a. Metric conversion is expected to have a significant impact on supply and maintenance functions. A significant cost of metric conversion will occur because of the need to support both inch-pound and metric equipment simultaneously in the DoD supply system for an interim period. It is probable that the number of items in supply could significantly increase (currently about 4 million items) over the short term during the transition to a future metric inventory. In maintenance, there may be problems between look-alike metric and nonmetric materiel.

b. These problems need to be defined more precisely to enable action that will avoid adverse impact.

Purpose. Review in detail and prepare guidance, as necessary, that describes problems and prescribes near and long-term solutions.

Action Office. Deputy Assistant Secretary of Defense for Supply, Maintenance, and Transportation, OASD(MRA&L).

Schedule:

	Target	Actual
Initiate	November 1980	November 1980
Complete	July 1982	

Task Identification. MET-7

Title. Investigate need for establishment of an operational M-day.

Problem. The term M-day is being used by several countries converting to the metric system, particularly by individual segments of the industrial sector. It is also being used by some large companies in the United States to indicate a particularly momentous achievement. As used here, it refers specifically to that moment in global time after which military operations shall be carried out in metric units of measurement (that is, before M-day, operations would be conducted in customary U.S. inch-pound units, and after M-day, they would be conducted in metric). An informal suggestion from an Australian navy correspondent proposes a single global M-day for the navies of the United States, United Kingdom, and Australia.

Purpose

a. Phase I. Conduct an initial study to determine the need or feasibility of establishing an operational M-day for U.S. Armed Forces. Determine the scope of the investigative work necessary to establish a specific M-day, giving primary consideration to the operational needs of the individual Military Services. Phase I should culminate in a report to the DoD MSG and consist of:

(1) A statement whether or not an operational M-day is needed, supported by the initial investigation.

(2) A statement of the feasibility or infeasibility of establishing one or more operational M-days for U.S. Armed Forces, if the initial study finding supports the concept of an operational M-day.

(3) A definitive scope of work for continuing the study in Phase II, should the study find that establishing an operational M-day is feasible.

(4) A recommendation concerning the DoD Component action office that should be assigned to prepare Phase II of the study. Consideration shall also be given to acquiring the services of a private contractor for Phase II.

b. Phase II. Based upon the scope of work defined in Phase I, the continued effort shall examine all aspects of the operational needs of the Military Services related to metric units of measurement, and attempt to determine a specific date or time frame for an operational M-day. Also considered and examined shall be the feasibility of:

(1) A single M-day for the United States and its metric-oriented allies.

(2) Relating M-day to a major international event, such as the mandatory effective date of the Intergovernmental Maritime Consultative Organization (IMCO) regulation (about 1985).

Action Office

a. Phase I. Specifically, Joint Chiefs of Staff

* b. Phase II. Specifically, Joint Chiefs of Staff *

Schedule:

	Target	Actual
a. Phase I		
Initiate	November 1980	November 1980
* Complete	November 1982	*
b. Phase II		
* Initiate	December 1982	*
Complete	December 1983	

#(Ch 1 (REPRINT), March 22, 1983)

Task Identification. MET-8

Title. Revision of DoD regulations.

Problem. DoD Components have measurement-sensitive regulations, such as manuals, pamphlets, handbooks, directives, and instructions. DoD Directive 4120.18 (reference (a)) requires use of the metric system in all of its activities, consistent with operational, economical, technical, and safety requirements. Accordingly, it is essential that all such measurement-sensitive regulations be reviewed to determine the need for revision, including the removal of regulatory barriers to the use of metric measurement.

Purpose

a. Phase I. DoD Components shall determine and compile a list of measurement-sensitive regulations requiring conversion.

b. Phase II. Revise applicable regulations.

Action Office. Applicable action offices within DoD Components.

Schedule:

	Target	Actual
a. Phase I		
Initiate	April 1981	
Complete	April 1982	
b. Phase II		
Initiate	To be determined	
Complete	To be determined	

Task Identification. MET-9

Title. Develop contract guidance for acquisition of metric materiel.

Problem

a. The current Defense Acquisition Regulations do not now provide guidance on the use of metric measurements in DoD acquisition programs.

b. Adequate guidance needs to be made available to acquisition activities for use in the solicitation of bids and proposals, contract awards, and their administration.

Purpose. Review Defense Acquisition Regulations to determine the changes necessary to remove barriers to the acquisition of metric materiel. Develop and implement the necessary contractual clauses.

* Action Office. Director, Contract Administration, ODUSD(AM), OUSDR&E. *

Schedule:

		Target	Actual	
*	Initiate	August 1981	July 1981	*
	Complete	July 1983		

Task Identification. MET-10

Title. Conversion of specifications and standards.

Problems

a. The availability of specifications and standards is a key factor in any decision to use the metric system in new designs. Progress within the Department of Defense in developing metric specifications and standards has been slow.

b. It has been impractical for many recent programs to employ metric measurement, due in large part to unavailability of metric specifications and standards. A complete spectrum of metric specifications and standards needs to be developed to support acquisition initiatives in accordance with DoD metric policy.

Purpose. To provide a firm date upon which future plans can be based, emphasis shall be placed on documents for common hardware items, materials, and engineering practices, including:

a. Schedule preparation of metric specifications and standards on an accelerated basis at the earliest practical date, emphasizing areas where the private sector cannot or will not prepare the documents.

b. Participate with national and international standardization activities in preparation of metric documents, and assume a fair share of the workload.

c. Adjust 5-year standardization plans (DoD 4120.3-M (reference (e)), accordingly.

* Action Office. The Defense Materiel Specifications and Standard Office (DMSSO), ODUSD(AM), OUSDR&E. *

Schedule:

	Target	Actual
Initiate	March 1980	March 1980
Issue Guidance	December 1980	December 1980
Complete	January 1990	

Task Identification. MET-11

Title. Impact of Metric Conversion on Computer Software Programs

Problem

a. Metric conversion shall have a number of important impacts on data processing operations. For instance, on computer outputs, it is important to use the correct symbols and SI units. This problem is compounded by the relative unavailability of computer printers with proper SI symbols. The Department of Defense, with its numerous applications of computerized data, must initiate action with the National Bureau of Standards (NBS) to coordinate the usage of metric symbology in data systems under established and accepted international and national documents such as ISO Standards 2955, "Information Progressing Representations of SI and Other Units for Use in Systems with Limited Character Sets," and ANSI/IEEE 260, "Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units and Certain Other Units)." This may require the preparation by NBS of a federal information processing standard (FIPS) for metric symbology.

b. Since metric conversion shall be a gradual process, computer programs, over a long period of time, may have to be revised so both input and output can accept dual dimensions. Columns and fields previously defined for one system of measurement shall have to be changed, which may require additional lines and wider fields. However, the functional user is responsible for deciding the extent and pace of change. Many of the conversions may be accomplished in parallel with previously planned applications redesign or modification.

Purpose. Establish a high level ad hoc committee to identify the issues and recommend implementation actions.

Action Office. Directorate of Information Resources Management Office, Office of the Deputy Assistant Secretary of Defense (Management Systems), Office of the Assistant Secretary of Defense (Comptroller).

Schedule:

	Target	Actual
Initiate	May 1982	May 1982
Identify Issues	August 1983	
Implementation	Continuous	

APPENDIX G.8

PROPOSED RULE ON THE USE OF METRIC SYSTEM OF MEASUREMENT IN FEDERAL STANDARDIZATION DOCUMENTS

GENERAL SERVICES ADMINISTRATION

41 CFR Part 101-29

Use of Metric System of Measurement in Federal Standardization Documents

AGENCY: Office of Acquisition Policy, GSA.

ACTION: Proposed rule.

SUMMARY: This proposed amendment to the Federal Property management Regulations will implement Pub. L. 94-168 by providing an approach for eliminating barriers to the procurement of metric goods and services. The proposed provisions will expand the procurement base of Federal agencies by placing products produced in U.S. customary units and metric units on an equal competitive basis.

DATE: Comments must be received by August 15, 1983.

ADDRESS: Send comments to: General Services Administration, Office of Acquisition Policy (VC), Washington, D.C. 20405.

FOR FURTHER INFORMATION CONTACT: Mr. Michael N. Zabych, GSA Metrication Coordinator, Office of Acquisition Management and Contract Clearance, Office of Acquisition Policy (VC), (202) 523-4873.

SUPPLEMENTARY INFORMATION: On December 23, 1975, the President signed the Metric Conversion Act of 1975 (Pub. L. 94-168; 15 U.S.C. 205a) which declared that the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States. Since the private sector of our economy has demonstrated the capability to provide metric products and services at reasonable or competitive prices, Federal agencies will consider the acquisition and use of such products or services to the maximum extent permitted by law and policy.

The General Services Administration has determined that this rule is not a major rule for the purpose of Executive Order 12291 of February 17, 1981, because it is not likely to result in an annual effect on the economy of $100 million or more; a major increase in costs to consumers or others; or significant adverse effects. The General Services Administration has based all administrative decisions underlying this rule on adequate information concerning the need for, and consequences of, this rule; has determined that the potential benefits to society from this rule outweigh the potential costs and has maximized the net benefits; and has chosen the alternative approach involving the least net costs to society.

List of Subjects in 41 CFR Part 101-29

Government property management.

PART 101-29—FEDERAL SPECIFICATIONS AND STANDARDS

(1) The table of contents for Part 101-29 is amended by adding one entry as follows:

Sec.
101-29.104 Use of metric system of measurement in Federal standardization documents.

Subpart 101-29—General

(2) Section 101-29.104 is added as follows:

§ 101-29.104 Use of metric system of measurement in Federal standardization documents.

(a) The policy of the United States is to coordinate and plan the increasing use of the metric system in the United States, (Pub. L. 94-168, 15 U.S.C. 205a).

(b) In furtherance of this policy, the Administrator of General Services shall develop procedures and plan for the increasing use of metric products by requiring agencies to:

(1) Maintain close coordination with and continuous monitoring of conversion plans of other Federal agencies, State and local governments, and the private sector.

(2) Review, prepare and revise Federal standardization documents to eliminate barriers to the procurement of metric goods and services. Such review and revision of documents shall be performed concurrently with the overage document review by FSC class or when specifically informed by the private sector that metric products can be produced in a specific FSC class.

Dated: July 12, 1983.

Allan W. Beres,

Assistant Administrator for Acquisition Policy.

[FR Doc. 83-[illegible] Filed 7-19-83; 8:45 am]

BILLING CODE 6820-61-M

APPENDIX G.9

PREFERRED METRIC UNITS FOR GENERAL USE BY FEDERAL GOVERNMENT, GENERAL SERVICES ADMINISTRATION, MAY 5, 1983

May 5, 1983

FEDERAL STANDARD 376A

Superseding Fed. Std. No. 376 July 8, 1980

PREFERRED METRIC UNITS FOR GENERAL USE BY THE FEDERAL GOVERNMENT

This Standard was approved by the Assistant Administrator,
Office of Federal Supply and Services

General Services Administration

FSC MISC

U.S. GOVERNMENT PRINTING OFFICE : 1983 - 381-595/5396

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Foreword

This standard was developed by the Metric Practice and Preferred Units Subcommittee of the Metrication Operating Committee of the Interagency Committee on Metric Policy. Before issue, it was coordinated with all Departments and Agencies of the Federal Government.

It is recognized that some Departments and Agencies will have need to convert from presently-used special-field inch-pound units that are not in the general list of metric units. Those Departments/Agencies are encouraged to prepare supplemental lists of preferred units for their special fields.

Table of Contents

1. Scope 1

2. Referenced Documents 1

3. Definitions 1

4. General Requirements 1-3

5. Detailed Requirements 3

6. Changes 3

Table I 4-10

Alphabetical Index 11-13

1. SCOPE

1.1 This standard lists preferred metric units (SI units and units accepted for use with SI) recommended for use throughout the Federal Government, as appropriate.

2. REFERENCED DOCUMENTS

2.1 The following documents form a part of this standard to the extent specified herein:

ISO 1000 - SI Units and Recommendations for the use of their Multiples and of Certain Other Units, 1981 edition.

(Application for copies of this International Organization for Standardization (ISO) Standard should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018.)

ASTM E 380-82 - Standard for Metric Practice.

(Application for copies should be addressed to the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.)

ANSI/IEEE Standard 268-1982 - Standard Metric Practice.

(Application for copies should be addressed to the Institute of Electrical and Electronics Engineers (IEEE), 345 East 47th Street, New York, NY 10017.)

ANMC-78-1 - Metric Editorial Guide (third edition).

(Application for copies should be addressed to the American National Metric Council (ANMC), 5401 Grosvenor Lane, Bethesda, MD 20814.)

3. DEFINITIONS

3.1 SI - The International System of Units (from the French "Le Système International d' Unités"), as modified for use in the United States by the Secretary of Commerce.

3.2 Inch-pound units - Units based upon the yard and the pound commonly used in the United States of America and defined by the National Bureau of Standards. Note that units having the same names in other countries may differ in magnitude. For purposes of this document, inch-pound units include other units used extensively at present.

4. GENERAL REQUIREMENTS

4.1 Preferred Metric Units - The preferred metric units shall be in accordance with Table I.

4.1.1 Table 1 lists preferred metric units (SI units and units accepted for use with SI) recommended for use throughout the Federal Government. Some Government agencies will develop supplemental lists applicable to their special fields. Such supplemental lists may, if desired by the preparing agency, include all listings in the Table.

4.1.2 Table 1 is consistent with ASTM E 380-82 and ANSI/IEEE Standard 268-1982, in which conversion factors to SI units only are listed; SI units are the coherent set of base, supplementary, and derived units without prefixes, except for the base unit kilogram. In the Table conversion factors to the appropriate sized metric unit (SI unit with prefix as needed or non-SI unit accepted for use with SI) are listed.

4.2 Arrangement. The listings are in the same order as in ISO Standard 1000. The index following the Table is in alphabetical order and includes listings of quantities (Col. 2 of Table), inch-pound units(Col. 3), and SI metric units (Col. 4). Some of the listings in column 3 of the Table (inch-pound units) are metric units that have been in common use.

4.3 Rates and Other Derived Quantities. It is not practical to list all quantities, but others such as rates can be readily derived. For example, to convert from in/s to cm/s multiply by 2.54; to convert from Btu/lb to J/kg multiply by (1055.056)/(0.453 592 37) or 2326.000.

4.4 Conversion Factors. Conversion factors are shown from inch-pound values to metric values, generally to seven significant digits.

4.4.1 Exact conversion factors are indicated by an asterisk(*).

4.4.2 For conversion from metric values to inch-pound values, divide rather than multiply by the factor. For example, to convert 16.3 meters to yards divide by 0.9144; the answer is 17.826 yards, which rounds to 17.8 yards.

4.5 Rounding. The following guidance on rounding is quoted from the ANMC Metric Editorial Guide, third edition, and is applicable to converting to inch-pound values as well as to metric values. For everyday rounding of metric values obtained by converting untoleranced inch-pound values, the following simplified rules are suggested, but for more sophisticated rounding rules, see Section 4 of ASTM E 380-82 or ANSI/IEEE Std 268-1982.

(a) If the inch-pound value is expressed by a combination of units such as feet and inches, or pounds and ounces, first express it in terms of the smaller unit.

Example: 14 ft 5 in = 173 in

(b) When the digits to be discarded begin with a 5 or more, increase by one unit the last digit retained.

Example: 8.3745, if rounded to three digits, would be 8.37;
if rounded to four digits 8.375.

(c) Multiply the inch-pound value by the conversion factor. If the first significant* digit of the metric value is equal to or larger than the first significant digit of the inch-pound value, round the metric value to the same number of significant digits as there are in the inch-pound value.

Examples: 11 mi x 1.609 km/mi = 17.699 km which rounds to 18 km
61 mi x 1.609 km/mi = 98.149 km which rounds to 98 km

If smaller, round to one more significant digit.

Examples: 66 mi x 1.609 km/mi = 106.194 km which rounds to 106 km
8 ft x 0.3048 m/ft = 2.4384 m which rounds to 2.4 m

(d) Exceptions. It is sometimes better to round to one less digit than specified above. For example, according to Rule (c), 26 pounds per square inch air pressure in an automobile tire would be converted as follows:

26 psi** x 6.895 kPa/psi = 179.27 kPa which rounds to 179 kPa

but 180 kPa, where the zero is not a significant digit, would usually be better because tire pressures are not expected to be very precise.

The rules do not apply to conversion of °F to °C.

(e) The simplified rules given above do not eliminate the necessity for using good judgment. If you believe that a dimension given merely as 8 ft is actually valid to the nearest 1/10 inch, you should consider it to mean 96.0 inches (per (a)) and treat it as having three significant digits. The rounded dimension would then be 2.438 m instead of 2.4 m.

Where an inch-pound value represents a maximum or minimum limit that must be respected, the rounding must be in the direction that does not violate the original limit.

---

*One or more zeroes at the beginning of a number are not called "significant". Zeroes at the end of a number are not considered significant unless their use results in a number that is closer to the true value than would be the case if the number were increased or decreased by 1.

** Abbreviation for pound-force per square inch (lbf/in^2).

4.6 Notes. In Table 1, reference is made to these notes. Note identification is shown in parentheses in last column.

(a) Use of the degree and its decimal submultiples is permissible when radian is not a convenient unit. Use of the minute and second is discouraged except for special fields such as cartography.

(b) The nautical mile (nmi) equals exactly 1852 meters by definition. The knot is equal to one nautical mile per hour. The nautical mile and the knot are units acceptable for use with SI temporarily.

(c) In surveying and cartography, use is made of the U.S. statute mile based on the U.S. survey foot, which is longer than the international foot by two parts per million. The factors used in the Table for statute mile, acre, acre foot, and square statute mile are based on the U.S. survey foot. Factors for all other length, area, and volume values are based on the international foot.

(d) The term "micron" has been superseded by the term "micrometer".

(e) If you wish to convert fuel efficiency (mi/gal) to fuel consumption (L/100 km), use the formula:

$$235.215 \div (\text{mi/gal}) = \text{L/100 km}$$

(f) The listed equivalences between metric and inch-pound kitchen measures are based on a metric cup of 250 mL, a metric tablespoon of 15 mL, and a metric teaspoon of 5 mL.

(g) In common parlance, the word "weight" is often used to mean "mass".

(h) The unit "cal" should not be confused with kcal. The unit kcal is often called Calorie, with capital C as its symbol, especially in nutrition. The unit cal_{th} (thermochemical) is equal to exactly 4.184 J.

(i) Unless otherwise indicated, all Btu units in the Table are Btu_{IT} (International Table) adopted by the Fifth International Conference on the Properties of Steam, London, 1956.

(j) In these expressions $^{\circ}\text{C}$ indicates temperature intervals. Therefore, $^{\circ}\text{C}$ may be replaced by K if desired without changing the value or affecting the conversion factor. For example, in item 4-9.1 thermal conductivity, $1\ \text{W}/(\text{m}\cdot{}^{\circ}\text{C}) = 1\ \text{W}/(\text{m}\cdot\text{K})$.

5. DETAILED REQUIREMENTS

5.1 Not applicable.

6. CHANGES

6.1 When a Federal agency considers that there is a need for a revision of this standard, a written request for revision may be submitted to the General Services Administration, Office of Federal Supply and Services, Commodity Management Division (FCM), Washington, DC 20406. The request shall include data which support the proposed change. The Office of Federal Supply and Services, as custodian of this standard, will coordinate all suggested changes with the Metric Practice/Preferred Units Subcommittee of the Metrication Operating Committee of the Interagency Committee on Metric Policy, and will make changes in this standard based on the recommendations of this Subcommittee.

MILITARY INTERESTS:

Military Coordinating Activity

Navy - SH

CIVIL AGENCY COORDINATING ACTIVITY:
GSA - FSS

PREPARING ACTIVITY:

COM - OMP

TABLE I

Preferred Metric Units for General Use by the Federal Government

ISO 1. Space and Time	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
1-1.1	plane angle	rad	rad	*1.0 (same unit)
		°(degree)	rad	0.017 453 29
		°(degree)	°	*1.0 (a) (same unit)
		'(minute)	'	*1.0 (a) (same unit)
		"(second)	"	*1.0 (a) (same unit)
		grade (gon)	rad	0.015 707 96
1-2.1	solid angle	sr	sr	*1.0 (same unit)
1-3.1	length	nmi (nautical mile)	nmi	*1.0 (b) (same unit)
		mi (statute)	km	1.609 347 (c)
		mi (int)	km	*1.609 344 (c)
		fathom	m	*1.328 8
		yd	m	*0.914 4
		ft (survey)	m	0.304 800 6 (c)
		ft (int)	m	*0.304 8 (c)
		in	cm	*2.54
		in	mm	*25.4
		mil	µm	*25.4
		micron	µm	*1.0 (d) (same unit)
		µin	µm	*0.025 4
		Å	nm	*0.1
1-3.1a	fuel efficiency	mi/gal	km/L	0.425 143 7 (e)
1-4.1	area	mi^2 (statute)	km^2	2.589 998 (c)
		acre	ha	0.404 687 3 (c)
		acre	m^2	4 046.873 (c)
		yd^2	m^2	0.836 127 4
		ft^2	m^2	*0.092 903 04
		in^2	cm^2	*6.451 6
		in^2	mm^2	*645.16
		circular mil	$µm^2$	506.707 5

ISO	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
1-5.1	volume	acre foot	m^3	1 233.489 (c)
		yd^3	m^3	0.764 554 9
		bbl (oil) (42 gallons)	m^3	0.158 987 3
		ft^3	m^3	0.028 316 85
		ft^3	L	28.316 85
		board foot	m^3	0.002 359 737
		bushel	L	35.239 07
		peck	L	8.809 768
		gallon (liq)	L	3.785 412
		quart (liq)	L	0.946 352 9
		pint (liq)	L	0.473 176 5
		fl oz	mL	29.573 53
		in^3	cm^3	16.387 06
		cup	mL	236.588 2
		cup	metric cup	1.0 (f)
		tablespoon	mL	14.786 76
		tablespoon	metric tablespoon	1.0 (f)
		teaspoon	mL	4.928 922
		teaspoon	metric teaspoon	1.0 (f)
1-6.1	time	yr (year)	a (year)	*1.0 (same unit, different symbol)
		d (day)	d (day)	*1.0 (same unit)
		h	h	*1.0 (same unit)
		min	min	*1.0 (same unit)
		s	s	*1.0 (same unit)
1-7.1	angular velocity	rad/s	rad/s	*1.0 (same unit)
1-9.1	velocity	kn (knot)	kn (knot)	*1.0 (b) (same unit)
		mi/h	km/h	1.609 347
		ft/s	m/s	*0.304 8
1-10.1	acceleration	ft/s^2	m/s^2	*0.304 8

ISO	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
2. Periodic and Related Phenomena				
2-3.1	frequency	c/s (formerly cps, cycles per second)	Hz	*1.0
2-3.2	rotational frequency	r/s (formerly rps, revolutions per second)	r/s	*1.0 (same unit)
		r/min (formerly rpm, revolutions per minute)	r/min	*1.0 (same unit)
3. Mechanics				
3-1.1	mass (weight)	ton (long)	t(metric ton) (1 t=1000 kg)	1.016 047 (g)
		ton (short)	t(metric ton)	*0.907 184 74 (g)
		slug	kg	14.593 90 (g)
		lb (avdp)	kg	*0.453 592 37 (g)
		oz (troy)	g	31.103 48 (g)
		oz (avdp)	g	28.349 52 (g)
		grain	mg	*64.798 91 (g)
3-1.1a	moment of mass	lb·ft	kg·m	0.138 255 0
3-2.1	density	ton (short) /yd^3	t/m^3	1.186 553
		lb/ft^3	kg/m^3	16.018 46
3-2.1a	concentration (mass)	lb/gal	g/L	119.826 4
		oz/gal	g/L	7.489 152
3-7.1	momentum	lb·ft/s	kg·m/s	0.138 255 0
3-8.1	angular momentum	lb·ft^2/s	kg·m^2/s	0.042 140 11
3-9.1	moment of inertia	lb·ft^2	kg·m^2	0.042 140 11
3-10.1	force	kip	kN	4.448 222
		lbf	N	4.448 222
		poundal	N	0.138 255 0

ISO	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
3-12.1	moment of force, torque	lbf·ft	N·m	1.355 818
		lbf·in	N·m	0.112 984 8
3-13.1	pressure	atm (std)	kPa	*101.325
		bar	kPa	*100.00
		lbf/in^2 (formerly psi)	kPa	6.894 757
		inHg (32 °F)	kPa	3.386 38
		ftH$_2$O (39.2 °F)	kPa	2.988 98
		inH$_2$O (60 °F)	kPa	0.248 84
		mmHg (0 °C)	kPa	0.133 322
		mbar	kPa	*0.1
3-13.2	stress	kip/in^2 (formerly ksi)	MPa	6.894 757
		lbf/in^2 (formerly psi)	MPa	0.006 894 757
		lbf/in^2 (formerly psi)	kPa	6.894 757
		lbf/ft^2	kPa	0.047 880 26
3-16.1	modulus of elasticity	kip/in^2 (formerly ksi)	GPa	0.006 894 757
3-18.1	second moment of area	in^4	cm^4	41.623 14
3-19.1	section modulus	in^3	cm^3	16.387 06
3-19.2	warping constant	in^6	cm^6	268.535 9
3-21.1	viscosity (dynamic)	cP (centipoise)	mPa·s	*1.0
3-22.1	viscosity (kinematic)	cSt (centistokes)	mm^2/s	*1.0
3-23.1	surface tension	lbf/ft	N/m	14.593 90

I.D	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
3-24.1	energy, work	kWh	MJ	*3.6
		cal_{th}	J	*4.184 (h)
		Btu	kJ	1.055 056 (i)
		ft·lbf	J	1.355 818
		therm (US)	MJ	105.4804
3-25.1	power	ton (refrigeration)	kW	3.516 800
		Btu/s	kW	1.055 056 (i)
		hp(550 ft·lbf/s)	kW	0.745 699 9
		hp (electric)	kW	*0.746
		Btu/h	W	0.293 071 1 (i)
4. Heat				
4-1.1	thermodynamic temperature	°F	K	$*T_K = (t_{°F} + 459.67)/1.8$
4-1.1a	temperature interval	°F	K	*1/1.8 (j)
4-2.1	Celsius temperature	°F	°C	$*t_{°C} = (t_{°F} - 32)/1.8$
4-2.1a	temperature interval	°F	°C	*1/1.8 (j)
4-3.1	linear expansion coefficient	$°F^{-1}$	K^{-1} or $°C^{-1}$	*1.8
4-6.1	heat, quantity of heat	Same as energy or work, see 3-24.1		
4-7.1	heat flow rate	Btu/s	kW	1.055 056 (i)
		Btu/h	W	0.293 071 1 (i)
4-9.1	thermal conductivity	$Btu·in/(ft^2·h·°F)$	$W/(m·°C)$	0.144 227 9 (i) (j)
4-10.1	coefficient of heat transfer	$Btu/(ft^2·h·°F)$	$W/(m^2·°C)$	5.678 263 (i) (j)
4-14.1	heat capacity	Btu/°F	kJ/°C	1.899 108 (i) (j)

ISO	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
4-15.1	specific heat capacity	Btu/(lb·°F)	kJ/(kg·°C)	*4.186 8 (i)
4-17.1	entropy	Btu/°F	kJ/°C	1.899 108 (i)
4-18.1	specific entropy	Btu/(lb·°F)	kJ/(kg·°C)	*4.186 8 (i)
4-20.1	specific internal energy	Btu/lb	kJ/kg	*2.326 (i)
5. Electricity and Magnetism (any suitable prefix depending upon the magnitude of the quantity)				
5-1.1	electric current	A	A	*1.0 (same unit)
5-2.1	electric charge	Ah	C	*3600.0
		C	C	*1.0 (same unit)
5-6.1	electric potential, potential difference, electromotive force	V	V	*1.0 (same unit)
5-9.1	capacitance	F	F	*1.0 (same unit)
5-17.1	magnetic field strength	oersted	A/m	79.577 47
5-19.1	magnetic flux density	gauss	μT	*100.0
5-20.1	magnetic flux	maxwell	nWb	*10.0
5-22.1	inductance	H	H	*1.0 (same unit)
5-33.1	electric resistance	Ω	Ω	*1.0 (same unit)
5-34.1	conductance	mho	S	*1.0
5-35.1	resistivity	ohm circular mil per foot	nΩ·m	1.662 426
5-36.1	conductivity	mho/cm	S/m	*100.00
6. Light and Related Electromagnetic Radiation				
6-3.1	wavelength	Å	nm	*0.1
6-11.1	radiant intensity	W/sr	W/sr	*1.0 (same unit)

ISO	Quantity	From Inch-Pound Units	To Metric Units	Multiply by
6-12.1	radiance	W/(sr·m^2)	W/(sr·m^2)	*1.0 (same unit)
6-14.1	irradiance	W/m^2	W/m^2	*1.0 (same unit)
6-19.1	luminous intensity	cd	cd	*1.0 (same unit)
6-20.1	luminous flux	lm	lm	*1.0 (same unit)
6-21.1	quantity of light	lm·s	lm·s	*1.0 (same unit)
6-22.1	luminance	lambert (L)	cd/cm^2	0.318 309 9
		cd/in^2	cd/cm^2	0.155 000 3
		footlambert (fL)	cd/m^2	3.426 259
6-23.1	luminous exitance	lm/ft^2	lm/m^2	10.763 91
6-24.1	illuminance	fc (footcandle)	lx	10.763 91
10. Nuclear Reaction and Ionizing Radiation				
10-47.1	activity (of a radionuclide)	curie (Ci)	MBq (Bq - becquerel)	*37 000.
10-49.1	absorbed dose	rad	Gy (gray)	*0.01
		rad	cGy	*1.0
10-49.2	dose equivalent	rem	Sv (sievert)	*0.01
		rem	mSv	*10.0
		mrem	mSv	*0.01
		mrem	µSv	*10.0
10-55.1	exposure (x- and gamma rays)	roentgen (R)	C/kg	0.000 258

*Denotes exact conversion factor

Alphabetical Index

A

absorbed dose . . . 10-49.1
acceleration . . . 1-10.1
acre . . . 1-4.1
acre foot . . . 1-5.1
activity (of a radionuclide) . . . 10-47.1
ampere . . . 5-1.1
ampere hour . . . 5-2.1
ampere per meter . . . 5-17.1
angle, plane . . . 4.6 (Note a), 1-1.1
angle, solid . . . 1-2.1
angstrom . . . 1-3.1, 6-3.1
angular momentum . . . 3-8.1
angular velocity . . . 1-7.1
ANMC Metric Editorial Guide . . . 4.5
ANSI/IEEE Std 268 . . . 4.1.2, 4.5
area . . . 1-4.1
ASTM Standard E 380 . . . 4.1.2, 4.5
atmosphere . . . 3-13.1

B

bar . . . 3-13.1
barrel (oil) . . . 1-5.1
becquerel . . . 10-47.1
board foot . . . 1-5.1
British thermal unit . . . 3-24.1
British thermal unit inch per
  square-foot hour °F . . . 4-9.1
British thermal unit per °F . . . 4-14.1, 4-17.1
British thermal unit per hour . . . 3-25.1
British thermal unit per pound . . . 4-20.1
British thermal unit per pound °F . . . 4-15.1, 4-18.1
British thermal unit per second . . . 3-25.1
British thermal unit per
  square-foot hour °F . . . 4-10.1
British thermal unit, definition . . . 4.6 (Note i)
bushel . . . 1-5.1

C

calorie . . . 3-24.1
Calorie (kilocalorie) . . . 4.6 (Note h)
candela . . . 6-19.1
candela per square centimeter . . . 6-22.1
candela per square meter . . . 6-22.1
candela per square inch . . . 6-22.1
candlepower . . . 6-19.1
capacitance . . . 5-9.1
Celsius temperature . . . 4-2.1
centigray . . . 10-49.1
centimeter . . . 1-3.1
centipoise . . . 3-21.1
centistokes . . . 3-22.1
charge, electric . . . 5-2.1
circular mil . . . 1-4.1
concentration (mass) . . . 3-2.1a
conductance, electric . . . 5-34.1
conductivity, electric . . . 5-36.1
conductivity, thermal . . . 4-9.1
conversion factors . . . 4.4
coulomb . . . 5-2.1
coulomb per kilogram . . . 10-55.1
cubic centimeter . . . 1-5.1
cubic decimeter (liter) . . . 1-5.1
cubic dekameter . . . 1-5.1
cubic foot . . . 1-5.1
cubic inch . . . 1-5.1
cubic meter . . . 1-5.1
cubic yard . . . 1-5.1
cup . . . 4.6 (Note f), 1-5.1
curie . . . 10-47.1
current . . . 5-1.1
cycle per second . . . 2-3.1

D

day . . . 1-6.1
degree, angle . . . 4.6 (Note a), 1-1.1
degree Celsius . . . 4-2.1, 4-2.1a
degree Fahrenheit . . . 4-1.1, etc.
degree, temperature . . . 4-1.1, etc.
density . . . 3-2.1
derived quantities . . . 4.3
dose, absorbed . . . 10-49.1
dose, equivalent . . . 10-49.2
dynamic viscosity . . . 3-21.1

E

elasticity, modulus of . . . 3-16.1
electric units . . . 5
electromagnetic radiation . . . 6
electromotive force . . . 5-6.1
energy . . . 3-24.1
energy, specific internal . . . 4-20.1
entropy . . . 4-17.1
entropy, specific . . . 4-18.1
exitance, luminous . . . 6-23.1
expansion (linear) per degree (temp) . . . 4-3.1
exposure (x- and gamma rays) . . . 10-55.1

F

Fahrenheit temperature . . . 4-1.1, etc.
farad . . . 5-9.1
fathom . . . 1-3.1
field strength, magnetic . . . 5-17.1
flow rates . . . 4.3
fluid ounce . . . 1-5.1
flux density, magnetic . . . 5-19.1
flux, luminous . . . 6-20.1
flux, magnetic . . . 5-20.1
footcandle . . . 6-24.1
footlambert . . . 6-22.1
foot (length) . . . 1-3.1
foot per second . . . 1-9.1
foot per second-squared . . . 1-10.1
foot pound (force) . . . 3-24.1
foot pound (force) per second . . . 3-25.1
foot (water) . . . 3-13.1
force . . . 3-10.1
force, moment of . . . 3-12.1
frequency . . . 2-3.1
frequency, rotational . . . 2-3.2
fuel consumption . . . 4.6 (Note e)
fuel efficiency . . . 4.6 (Note e), 1-3.1a

G

gallon . . . 1-5.1
gauss . . . 5-19.1
grain . . . 3-1.1
grade (gon) . . . 1-1.1
gram . . . 3-1.1
gray . . . 10-49.1

H

heat . . . 4, 3-24.1
heat capacity . . . 4-14.1
heat capacity, specific . . . 4-15.1
heat flow rate . . . 3-25.1, 4-7.1
heat transfer coefficient . . . 4-10.1
hectare . . . 1-4.1
henry . . . 5-22.1
hertz . . . 2-3.1
horsepower . . . 3-25.1
hour . . . 1-6.1

I

IEEE Standard 268 . . . 4.1.2
illuminance . . . 6-24.1
inch (length) . . . 1-3.1
inch (mercury) . . . 3-13.1
inch (water) . . . 3-13.1
inch-pound definition . . . 3.2
inductance . . . 5-22.1
inertia, moment of . . . 3-9.1
intensity, luminous . . . 6-19.1
intensity, radiant . . . 6-11.1
international foot . . . 1-3.1
international mile . . . 1-3.1
international units (length and area) . 4.6 (Note c)
ionizing radiation . . . 10
irradiance . . . 6-14.1
ISO Standard 1000 . . . 4.2

J

joule . . . 3-24.1

K

kelvin . . . 4-1.1a
kilocalorie . . . 4.6 (Note h)
kilogram . . . 3-1.1
kilogram meter . . . 3-1.1a
kilogram meter per second . . . 3-7.1
kilogram meter-squared . . . 3-9.1
kilogram meter-squared per second . . . 3-8.1
kilogram per cubic meter . . . 3-2.1
kilojoule per °C . . . 4-14.1, 14-17.1
kilojoule per kilogram . . . 4-20.1
kilojoule per kilogram °C . . . 4-15.1, 4-18.1
kilometer . . . 1-3.1
kilometer per hour . . . 1-9.1
kilometer per liter . . . 1-3.1a
kilonewton . . . 3-10.1
kilopascal, pressure . . . 3-13.1
kilopascal, stress . . . 3-13.2
kilopound (force) . . . 3-10.1
kilopound (force) per square inch . . . 3-13.2
kilowatt . . . 3-25.1
kilowatt hour . . . 3-24.1
kinematic viscosity . . . 3-22.1
kitchen measures . . . 4.6 (Note f)
knot . . . 4.6 (Note b), 1-9.1

L

lambert . . . 6-22.1
length . . . 1-3.1
light . . . 6
light, quantity of . . . 6-21.1
limits, maximum-minimum . . . 4.5
linear expansion coefficient . . . 4-3.1
liter . . . 1-5.1
liter per 100 kilometers . . . 4.6 (Note e)
long ton . . . 3-1.1
lumen . . . 6-20.1
lumen per square foot . . . 6-23.1
lumen per square meter . . . 6-23.1
lumen second . . . 6-21.1
luminance . . . 6-22.1
luminous exitance . . . 6-23.1
luminous flux . . . 6-20.1
luminous intensity . . . 6-19.1
lux . . . 6-24.1

M

magnetic field strength . . . 5-17.1
magnetic flux . . . 5-20.1
magnetic flux density . . . 5-19.1
magnetic induction . . . 5-19.1
magnetic units . . . 5
mass . . . 3-1.1
mass, moment of . . . 3-1.1a
maxwell . . . 5-20.1
mechanics . . . 3
megajoule . . . 3-24.1
megabecquerel . . . 10-47.1
megapascal, stress . . . 3-13.2
meter . . . 1-3.1
meter per second . . . 1-9.1
meter per second-squared . . . 1-10.1
Metric Editorial Guide . . . 4.5
metric ton . . . 3-1.1
metric ton per cubic meter . . . 3-2.1
mho . . . 5-34.1
mho per centimeter . . . 5-36.1
microinch . . . 1-3.1
micrometer . . . 1-3.1
micron . . . 1-3.1
microsievert . . . 10-49.2
microtesla . . . 5-19.1
mil, circular . . . 1-4.1
mil (length) . . . 1-3.1
mile . . . 1-3.1
mile, nautical . . . 4.6 (Note b), 1-3.1
mile per gallon . . . 4.6 (Note e), 1-3.1a
mile per hour . . . 1-9.1
mile, statute . . . 4.6 (Note c)
millibar . . . 3-13.1
milligram . . . 3-1.1
milliliter . . . 1-5.1
millimeter (length) . . . 1-3.1
millimeter (mercury) . . . 3-13.1
millipascal second . . . 3-21.1
millirem . . . 10-49.2
millisievert . . . 10-49.2
minute, angle . . . 4.6 (Note a), 1-10.1
minute, time . . . 1-6.1
modulus of elasticity . . . 3-16.1
modulus, section . . . 3-19.1
moment of area, second . . . 3-18.1
moment of force . . . 3-12.1
moment of inertia . . . 3-9.1
moment of mass . . . 3-1.1a
momentum . . . 3-7.1
momentum, angular . . . 3-8.1

N

nanometer . . . 1-3.1, 6-3.1
nanoohm meter . . . 5-35.1
nanoweber . . . 5-20.1
nautical mile . . . 4.6 (Note b), 1-3.1
newton . . . 3-10.1
newton per meter . . . 3-23.1
nuclear reactions . . . 10

O

oersted . . . 5-17.1
ohm . . . 5-33.1
ohm circular mil per foot . . . 5-35.1
ohm meter . . . 5-35.1
ounce, fluid . . . 1-5.1
ounce, mass (avdp) . . . 3-1.1
ounce, mass (troy) . . . 3-1.1

P

pascal, pressure . . . 3-13.1
pascal, stress . . . 3-13.2
peck . . . 1-5.1
periodic phenomena . . . 2
pint . . . 1-5.1
plane angle . . . 4.6 (Note a), 1-1.1
poise . . . 3-21.1
potential difference . . . 5-6.1

potential, electric 5-6.1
poundal 3-10.1
pound foot 3-1.1a
pound foot per second 3-7.1
pound foot-squared 3-9.1
pound foot-squared per second 3-8.1
pound (force) 3-10.1
pound (force) foot 3-12.1
pound (force) inch 3-12.1
pound (force) per foot 3-23.1
pound (force) per square foot 3-13.2
pound (force) per square inch (pressure) . 3-13.1
pound (force) per square inch (stress) . . 3-13.2
pound, mass (avdp) 3-1.1
pound per cubic foot 3-2.1
power 3-25.1
pressure 3-13.1

Q

quantity of heat 3-24.1, 4-6.1
quantity of light 6-21.1
quart 1-5.1

R

rad (absorbed dose) 10-49.1
radian . . . . 4.6 (Note a), 1-1.1
radiance 6-12.1
radian per second 1-7.1
radiant intensity 6-11.1
radiation, electromagnetic 6
radionuclide, activity of 10-47.1
rates 4.3
refrigeration ton 3-25.1
rem (dose equivalent) 10-49.2
resistance, electric 5-33.1
resistivity, electric 5-35.1
reverse conversion 4.4
revolution per minute 2-3.2
revolution per second 2-3.2
roentgen 10-55.1
rotational frequency 2-3.2
rounding 4.5

S

second, angle . . . . 4.6 (Note a), 1-1.1
second, time 1-6.1
second moment of area 3-18.1
section modulus 3-19.1
short ton 3-1.1
siemens 5-34.1
siemens per meter 5-36.1
sievert 10-49.2
significant digits 4.4, 4.5
SI units 3.1, 4.1.2
slug 3-1.1
solid angle 1-2.1
space and time 1
specific internal energy 4-20.1
specific entropy 4-18.1
specific heat capacity 4-15.1
square centimeter 1-4.1
square foot 1-4.1
square inch 1-4.1
square kilometer 1-4.1
square meter 1-4.1
square micrometer 1-4.1
square mile 1-4.1
square millimeter 1-4.1
square millimeter per second 3-22.1
square yard 1-4.1
statute mile 1-3.1
statute unit (length and area). . . . .4.6 (Note c)
steradian 1-2.1
stokes 3-22.1
stress 3-13.2
supplemental lists 4.1.1
surface tension 3-23.1
survey foot 1-3.1
survey units (length and area). . . . .4.6 (Note c)

T

tablespoon . . . . 4.6 (Note f), 1-5.1
teaspoon . . . . 4.6 (Note f), 1-5.1
temperature (discussion) . . . . . . 4.6 (Note j)
temperature interval 4-1.1a, 4-2.1a
temperature, thermodynamic 4-1.1
tesla 5-19.1
therm 3-24.1
thermal conductivity 4-9.1
thermodynamic temperature 4-1.1
time 1-6.1
ton (mass) 3-1.1
ton (metric) per cubic meter 3-2.1
ton per cubic yard 3-2.1
ton (refrigeration) 3-25.1
torque 3-12.1
transfer coefficient, heat 4-10.1
troy ounce 3-1.1

V

velocity 1-9.1
velocity, angular 1-7.1
viscosity, dynamic 3-21.1
viscosity, kinematic 3-22.1
volt 5-6.1
volume 1-5.1

W

warping constant 3-19.2
watt 3-25.1
watt per meter °C 4-9.1
watt per steradian 6-11.1
watt per steradian square meter 6-12.1
watt per square meter 6-14.1
watt per square meter °C 4-10.1
wavelength 6-3.1
weber 5-20.1
weight . . . . 4.6 (Note g), 3-1.1
work 3-24.1

Y

yard 1-3.1
year 1-6.1